Public Service Company of New Mexico
Project Power - New 115kV Transmission Line and Facilities in Santa Fe, New Mexico Area

Environmental Assessment

March 2004

U.S. Department of Interior
Bureau of Land Mangement
Taos Field Office

Taos, New Mexico

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BUREAU OF LAND MANAGEMENT

PRELIMINARY
DECISION RECORD

Proposal: Public Service of New Mexico (PNM) has applied to the Bureau of Land Management (BLM) for an amendment to an existing right-of-way in order to upgrade a 115 kV transmission electrical transmission line and widen the existing right-of-way, and for authorization to include a fiber optic line with the new transmission line. The transmission line upgrade with the new fiber optic line would cross public lands managed by the BLM northwest of Santa Fe, New Mexico. The upgraded transmission line and fiber optic line on public lands managed by BLM are part of a larger proposal to upgrade and enhance the electrical transmission system for the cities of Santa Fe and Las Vegas, New Mexico.

PNM's technical studies show that the existing transmission line system serving the area is reaching the limits of its load capacity, which would leave the area vulnerable to electrical system problems if there were a loss of a transmission line or other critical piece of equipment. Without this transmission line upgrade, studies have indicated that the Santa Fe/Las Vegas electrical system could experience serious problems as early as winter 2003-2004. With the increased loads that are expected on the system over the next several years, the risk of problems will also increase.

The BLM portion of the project lies in the Buckman area northwest of Santa Fe, originating at PNM's existing Norton Switching Station and continuing south and southeast, utilizing either of two existing power line corridors, for approximately 5.5 miles to the BLM boundary. Outside of the BLM boundary, the power line with a fiber optic line will continue across private lands and lands under the jurisdictions of the City of Santa Fe, Santa Fe County, and the State of New Mexico.

Decision to Be Made: The BLM only has the authority to make decisions regarding lands and resources managed by the BLM. Therefore, the decision to be made by BLM is whether or not the BLM will: (1) Authorize an amendment to the existing right-of-way to accommodate upgrades to the 115 kV transmission line and widening of the right-of-way, and (2) Authorize addition of a fiber optic line to the transmission line corridor. The decision will also address the location of and conditions under which these activities would be authorized.

The Environmental Assessment (EA) prepared for this project as required by the National Environmental Policy Act of 1969 (NEPA) provides the analytical basis for BLM to make a decision for BLM lands and resources. The EA will also provide important information to PNM, the City of Santa Fe, Santa Fe County, the State of New Mexico, and private citizens for making subsequent decisions regarding routes and facilities on lands within their jurisdictions and ownership.

Actions Connected to the Proposal Outside of this BLM Decision: Actions connected to this proposal but outside BLM's jurisdiction include determining the route of the 115 kV transmission line and fiber optic cable, replacing poles and lines, widening the rights-of-way in some areas, and retrofitting or constructing a new switching station. PNM has stated that they will continue to work with the other jurisdictional entities and private citizens to make decision regarding these potential activities.

Decision: It is my decision to select both action alternatives (BLM portions of alternatives A, F, O, and S) for potential implementation. While I am authorizing either of the two routes on BLM, only one route on BLM lands will ultimately be used. Once a route off BLM lands has been selected, the BLM will review and authorize PNM's updated applications for that connected route across BLM lands. Therefore, BLM will authorize upgrades to the 115 kV transmission line, addition of a fiber optic cable, and widening of the existing right-of-way for one of the two routes across BLM lands. I understand that PNM has committed to continue working with private citizens, the City of Santa Fe, Santa Fe County, and the State of New Mexico to identify the best possible route across those jurisdictions.

A map showing the two routes on BLM lands is provided on Figure 2-1 in the attached Environmental Assessment.

Rationale for Decision: My decision to authorize these activities is based on the following rationale:

- The activities within the selected alternatives are in conformance with the Taos Resource Management Plan (1988) and BLM policy and guidance.

- The major resource issues identified through BLM interdisciplinary review have been addressed in the analysis and considered in the decision. Based on the analysis in the EA, the impacts of the activities to be authorized are not expected to be significant.

- There are no adverse impacts to federally listed threatened or endangered plant or animal species or to cultural resources.

- This project is planned and designed to address current and future critical electrical transmission reliability and capacity problems for the cities of Santa Fe and Las Vegas. Preparation of the EA and this first phase decision by BLM facilitates continued discussion and planning for routing the line off BLM lands. In addition, this BLM decision allows the other jurisdictions to move forward in their analysis of routes without precluding selection of any of the four routes in their jurisdictions that are analyzed in detail in the EA.

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Taos Field Office Manager **Date**

BUREAU OF LAND MANAGEMENT

PRELIMINARY FINDING OF NO SIGNIFICANT IMPACT AND DECISION RECORD

Proposal: Public Service of New Mexico (PNM) has applied to the Bureau of Land Management (BLM) for an amendment to an existing right-of-way in order to upgrade a 115 kV transmission electrical transmission line and widen the existing right-of-way, and for authorization to include a fiber optic line with the new transmission line. The transmission line upgrade with the new fiber optic line would cross public lands managed by the BLM northwest of Santa Fe, New Mexico. The upgraded transmission line and fiber optic line on public lands managed by BLM are part of a larger proposal to upgrade and enhance the electrical transmission system for the cities of Santa Fe and Las Vegas, New Mexico.

PNM's technical studies show that the existing transmission line system serving the area is reaching the limits of its load capacity, which would leave the area vulnerable to electrical system problems if there were a loss of a transmission line or other critical piece of equipment. Without this transmission line upgrade, studies have indicated that the Santa Fe/Las Vegas electrical system could experience serious problems as early as winter 2003-2004. With the increased loads that are expected on the system over the next several years, the risk of problems will also increase.

The BLM portion of the project lies in the Buckman area northwest of Santa Fe, originating at PNM's existing Norton Switching Station and continuing south and southeast, utilizing either of two existing power line corridors, for approximately 5.5 miles to the BLM boundary. Outside of the BLM boundary, the power line with fiber optic line will continue across private lands and lands under the jurisdictions of the City of Santa Fe, Santa Fe County, and the State of New Mexico.

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The Environmental Assessment (EA) prepared for this project as required by the National Environmental Policy Act of 1969 (NEPA) provides the analytical basis for BLM to make a decision for BLM lands and resources. The EA will also provide important information to PNM, the City of Santa Fe, Santa Fe County, the State of New Mexico, and private citizens for making subsequent decisions regarding routes and facilities on lands within their jurisdictions and ownership

Actions Connected to the Proposal Outside of this BLM Decision: Actions connected to this proposal but outside BLM's jurisdiction include determining the route of the 115 kV transmission line and fiber optic cable, replacing poles and lines, widening the rights-of-way in some areas, and retro-fitting or constructing a new switching station. PNM has stated that they will continue to work with the other jurisdictional entities and private citizens to make decision regarding these potential activities.

Finding of No Significant Impacts: A thorough analysis of environmental impacts has been conducted and those impacts have been disclosed in the EA.

Decision: It is my decision to select both action alternatives (BLM portions of alternatives A, F, O, and S) for potential implementation. While I am authorizing either of the two routes on BLM, only one route on BLM lands will ultimately be used. Once a route off BLM lands has been selected, the BLM will review and authorize PNM's updated applications for that connected route across BLM lands. Therefore, BLM will authorize upgrades to the 115 kV transmission line, addition of a fiber optic cable, and widening of the existing right-of-way for one of the two routes across BLM lands. I understand that PNM has committed to continue working with private citizens, the City of Santa Fe, Santa Fe County, and the State of New Mexico to identify the best possible route across those jurisdictions.

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Taos Field Office Manager **Date**

List of Acronyms

AFDRC	Agua Fria Development Review Committee
AFVA	Agua Fria Village Association
BLM	Bureau of Land Management
BMP	Best Management Practice
CEQ	Council on Environmental Quality
CWG	Community Working Group
DOE	Department of Energy
EA	Environmental Assessment
EMF	Electro-Magnetic Fields
ETZ	Extraterritorial Zone
GIS	Geographic Information System
kV	Kilovolt
mG	milliGauss (measure of magnetic field)
MW	Megawatt
NEPA	National Environmental Policy Act
NESC	National Electric Safety Code
NRHP	National Register of Historic Places
PNM	Public Service Company of New Mexico
ROW	Right-of-Way
TES	Threatened, Endangered, and Other Special Status Species
THC	Traditional Historic Community
TWG	Technical Working Group
USFWS	US Fish and Wildlife Service
VRM	Visual Resource Management

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Chapter 1. Background and Purpose and Need for Project

1.1 Introduction

Public Service of New Mexico (PNM) has filed an application with the Bureau of Land Management (BLM) for a right-of-way for an electrical transmission line across public lands managed by BLM. This application for a right-of-way is part of a larger proposal to upgrade and enhance the electrical transmission system across lands under the jurisdictions of the City of Santa Fe, Santa Fe County, and the State of New Mexico, as well as private lands in the Santa Fe area.

On BLM lands, PNM is studying four alternatives for upgrading the existing structures on the 115kV Algodones-to-Norton (AN) transmission line, increasing the AN right-of-way to 75 feet, and converting the Norton-to-Zia (NZ) line on BLM lands to a double-circuit transmission line within existing right-of-way. No new access roads would be required on BLM lands. Temporary use areas would be required for work outside the right-of-way. When the lines are upgraded, both existing static wires would be reconductored and replaced with combined static/fiber optic wires. This fiber optic communication system would control, protect, and ensure the safety of the electrical system between stations and would improve the quality of communications over and above the existing system.

PNM's technical studies show that the existing transmission line system serving the area is reaching the limits of its load capacity, which would leave the area vulnerable to electrical system problems if there were a loss of a transmission line or other critical piece of equipment.

Without this transmission upgrade, studies have indicated that the Santa Fe/Las Vegas electrical system could experience serious problems as early as the winter 2003-2004, particularly if there is an outage of one of the two transmission lines or loss of other pieces of equipment that serve the area. With the increased loads that are expected on the system over the next several years, the risk of problems also will increase.

The need for PNM's proposed project, **Project Power: New 115 kV Transmission Line and Facilities in the Santa Fe Area,** is to:

1. Improve reliability of the transmission system serving Santa Fe, by providing a third 115 kilovolt (kV) circuit to relieve the loads on the two existing PNM transmission lines that currently serve the area;

2. Increase the electric transfer capacity of the transmission system serving Santa Fe and Las Vegas by 40 megawatts (MW); and

3. Provide the proposed system improvements by late 2004.

Four project alternatives, in addition to the No Action alternative, have been studied for this Environmental Assessment (EA). This EA has been prepared under the direction of the BLM, with the New Mexico State Land Office as a cooperating agency, and Santa Fe County and the City of Santa Fe as reviewing agencies.

This EA provides the analytical basis for BLM to make a decision regarding routes across public lands managed by BLM, as required by the National Environmental Policy Act (NEPA) of 1969. It also will provide important information to PNM, the City of Santa Fe, Santa Fe County, and the State of New Mexico for making subsequent decisions regarding routes and facilities on lands within their jurisdictions.

1.2 Conformance with Taos Resource Management Plan

This project conforms with the Taos Resource Management Plan (RMP) and pertinent amendments, such as RMP Amendment (1992) and La Cienega ACEC Plan. The project area avoids any special management use areas that would preclude the placement of transmission lines. The project area is recognized as having high demand for utility and communication rights-of-way for the Santa Fe area. The project would be consistent with those existing uses. Other plans and regulations pertaining to this project are listed in section 1.5.

1.3 Project Background

Electricity from PNM's generating plants is transmitted from PNM's primary 345kV transmission grid into the Santa Fe/Las Vegas area over two 115 kV transmission lines. As Figure 1-1 indicates, the Norton-to-Zia (NZ) line, which has been in service since 1958, delivers approximately 70 percent of the electricity to the Zia Switching Station in Santa Fe. The Reeves-to-Santa Fe (RS) line, which has been in service since 1957, delivers 30 percent of the electricity to the Zia Switching Station. At the switching station, the high voltage is reduced to a lower voltage appropriate for distribution to homes and businesses in the Santa Fe area. A third high-voltage transmission line, the Santa Fe-to-Las Vegas (SL) line, which has been in service since 1953, delivers electricity to the Valencia Substation in Las Vegas. There, the high voltage is reduced to a lower voltage appropriate for distribution to homes and businesses in the Las Vegas area. Figure 1-2 shows the current Santa Fe area transmission lines.

PNM serves 56,300 electric customers in Santa Fe, and those customers use about 68 million kilowatt hours of electricity per year. In Las Vegas, PNM serves 9,100 electric customers, who use 9.4 million kilowatt hours per year.

Figure 1-1. Existing Santa Fe and Las Vegas Area Transmission System

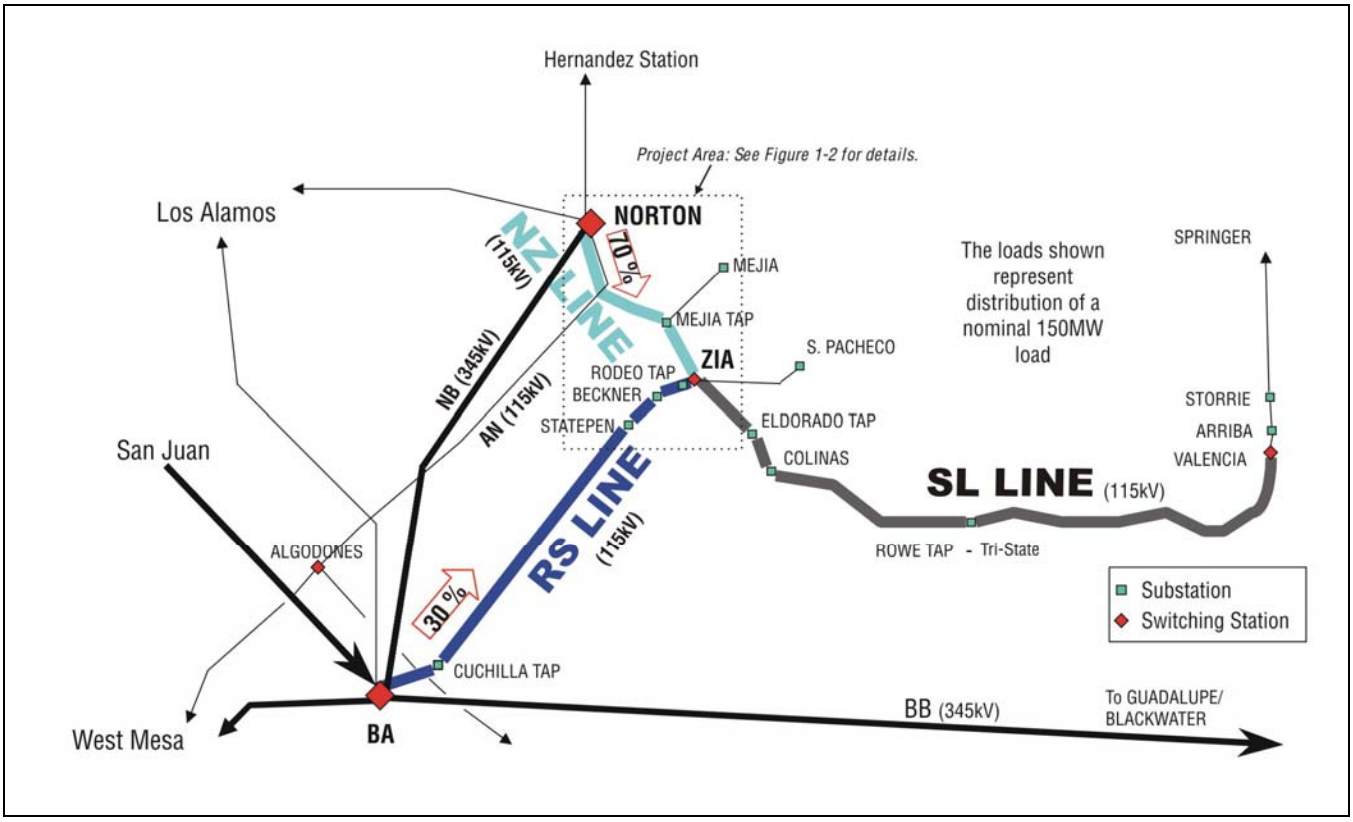
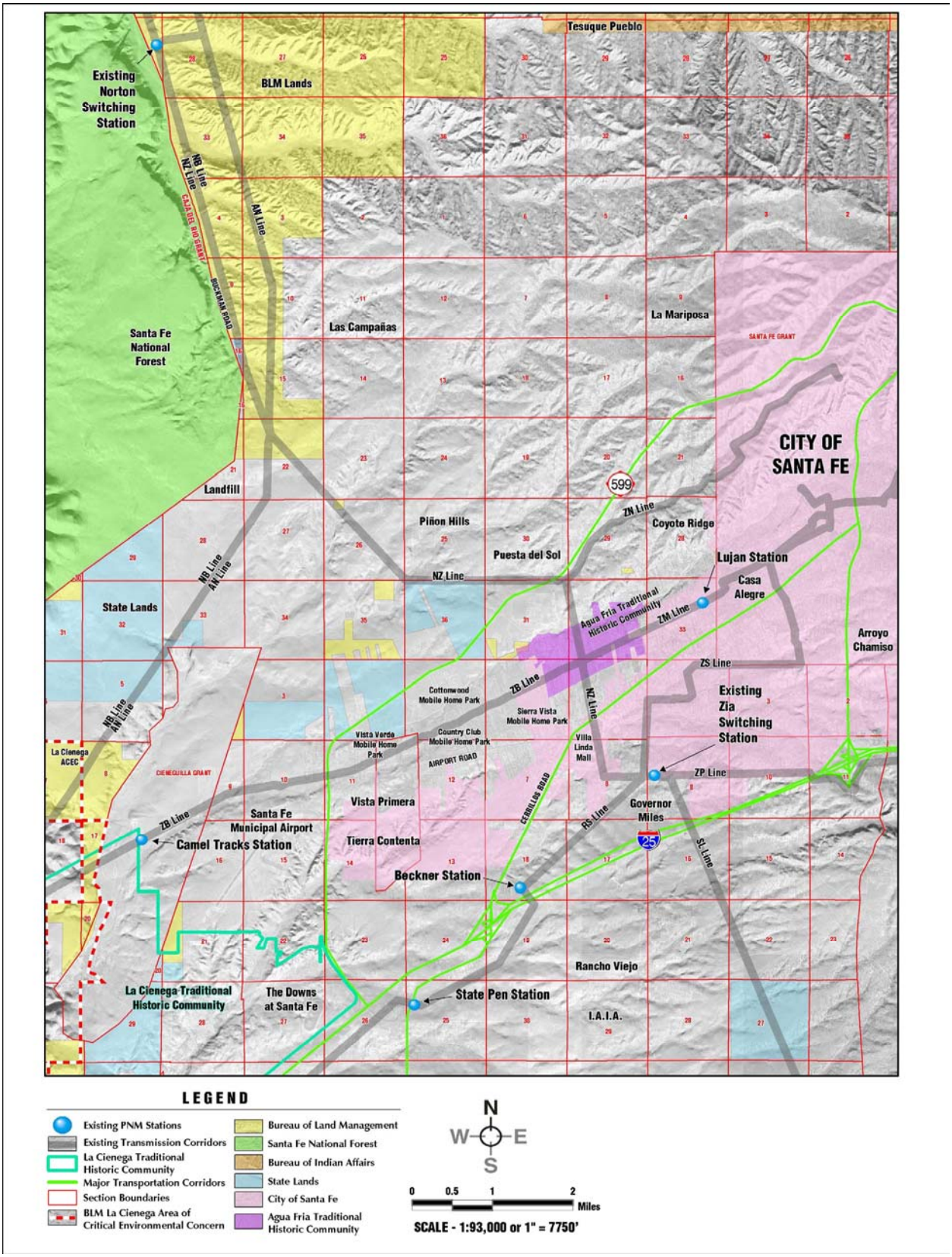
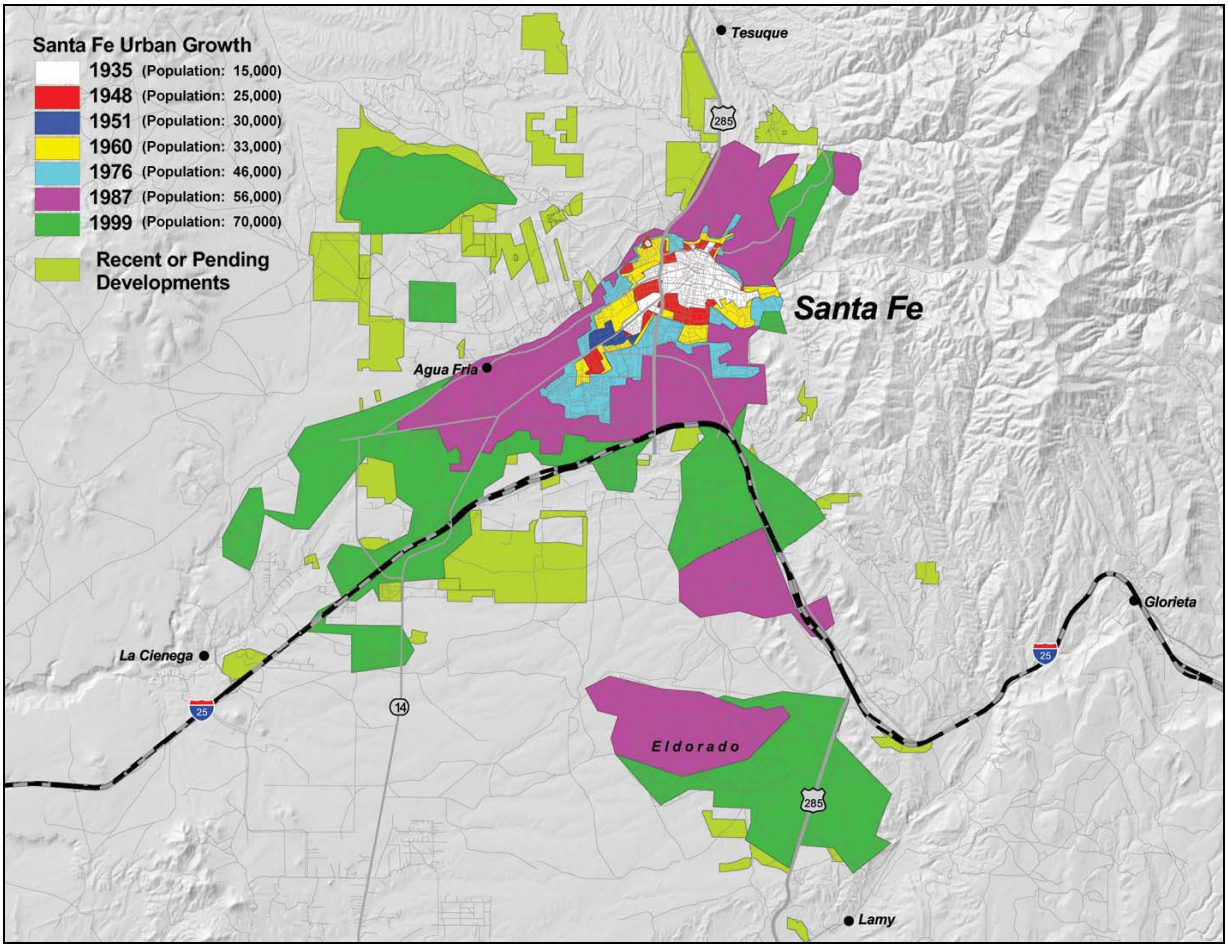


Figure 1-2. Current Santa Fe Area Transmission Lines



Customer demand on the system in the Santa Fe and Las Vegas area has experienced moderate but sustained growth over the years. The map in Figure 1-3 shows the growth since 1935 in the Santa Fe area, with the green areas indicating recent or planned development as of 2001. PNM studies show that the existing high-voltage transmission lines serving the Santa Fe and Las Vegas area are reaching their capacities.

Figure 1-3. Santa Fe Urban Growth Map



Aware of growing constraints on the system that serves Santa Fe and Las Vegas, PNM invested in a series of system improvements between 1993 and 2000 to stabilize and expand the system's capacity. These improvements include technical measures of adding shunt capacitors, voltage support measures, series capacitors, an autotransformer, transmission line ampacity improvements, and a capacitor bank to help bolster the backbone transmission system and lines in the area of concern.

Although these improvements have helped the reliability of the system in the Santa Fe and Las Vegas areas, system studies show that an additional source of power is needed to meet the reliability and growing load requirements in the area.

1.4 Purpose and Need for the Project / Summary of Issues

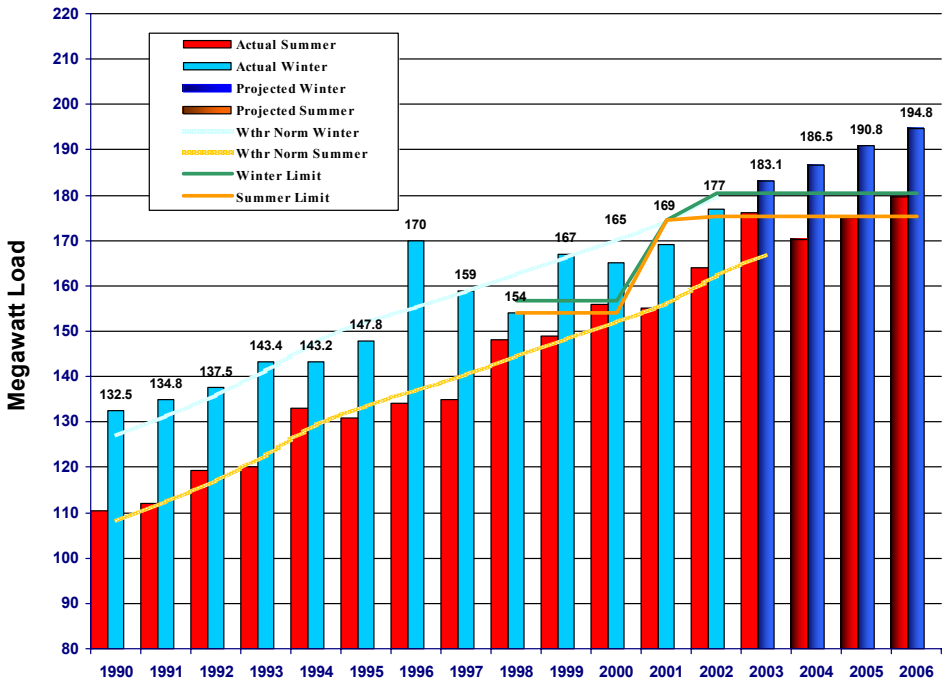
This project is needed because projected increased growth in the Santa Fe and Las Vegas areas will increase the stress on the system, which may lead to a violation of national standards and criteria for reliable electrical service as early as the winter of 2003-2004.

The loading of the system is already so critical that the NZ and RS lines can no longer be taken out of service for maintenance except for brief periods in the spring and fall when loads are at their lowest. Figure 1-4 presents the Santa Fe and Las Vegas area electric usage and projection information. The green Winter Limit line reflects the current n-1 capacity of the system while the blue bars depict actual and projected winter load.

PNM anticipates demand to increase an average of 2.5 percent per year through 2010, requiring approximately 4 megawatts (MW) of additional power per year over the next 10 years for a total of 40 MW.

Using the estimate of growth in electric load, in the winter of 2003-2004, the electric system in this area may be in violation of nationwide standards and criteria for reliable electrical service. These criteria are established by the North American Electric Reliability Council (NERC) and the Western Electricity Coordinating Council (WECC). Generally, the criteria require that, if there is an outage of one of the transmission lines or other critical piece of equipment that supply power to this area (a condition referred to as N-1), the remaining system must be able to safely serve the load in the area.

Figure 1-4
Santa Fe and Las Vegas Area Load Forecast



Criteria violations will occur whenever the load exceeds 180 MW.

The problem involves issues of both capacity and reliability. Availability of additional energy capacity to the area at or within a few miles of the Zia Switching Station is necessary. However, an additional pathway or circuit is required to provide necessary reliability for times when one or more facilities are out of service.

Unless improvements are made, the area's electrical system could experience problems and stresses including:

- **Low voltages** (causing the lights to go out),
- **Excessive drops in voltage** (causing the lights to flicker and computers to go out), and/or
- **Overloads on the system** (causing a loss of power) which could result in having to turn off power in order to maintain integrity of the system.

The probability that these electrical system problems will occur increases in direct relation to the amount of time that the capacity limits are exceeded.

While PNM and community representatives studied several energy alternatives in the course of this project, they determined that enhancing the transmission system was the best alternative to solve Santa Fe's short-term energy challenges.

1.4.1 Scoping Issues

Prior to submitting an application with the BLM, PNM conducted electric system planning studies and worked with the Santa Fe and Las Vegas communities to identify the project need and possible alternatives.

Three proposed alternatives for the project were presented at seven scoping meetings held between May and August 2003. Other alternatives that had been initially considered also were discussed. Each of the proposed route alternatives would originate from PNM's existing Norton Switching Station. The three alternatives included: **Alternative F,** Norton to the proposed Zia North Switching Station (PNM's Proposed Action), **Alternative A,** Norton to the existing Zia Switching Station, and **Alternative E,** Norton to Camel Tracks to the proposed Zia North Switching Station. The following is a summary of the issues most often raised during scoping.

1.4.1.1 Issues Specific to Alternatives

Issue 1: Impacts to Traditional Historic Communities

There are two Traditional Historic Communities in the Santa Fe area, Agua Fria and La Cienega. Each of the three alternatives presented in the scoping meetings would affect the Agua Fria community. Two of the alternatives (including PNM's Proposed Action, Norton to Zia North) would require building a new switching station, which became the focus of the concerns in Agua Fria. Some residents were also concerned about changing the existing single-circuit NZ transmission line crossing Agua Fria to taller double-circuit poles.

The residents of Agua Fria were concerned that the proposed Zia North Switching Station would further industrialize the rural setting of the community. They felt that the values of the Traditional Historic Community should be respected, and that the needs of the project could be met without placing new electrical facilities in their community.

Issue 2: Right-Of-Way Conflicts

Construction activities and land use restrictions along the right-of-way (ROW) of alternatives are topics of concern primarily along the Norton to Camel Tracks to Zia North alternative due to the narrow width of the existing ROW. Citizens expressed concern that they would have to move existing structures or would lose the possibility of

building new structures in the future if more right-of-way along the Zia to Bernalillo (ZB) line was required, or that property values could decrease due to such facilities.

Issue 3: Land Use Compatibility

The public raised general concerns about placing new transmission lines and switching facilities in residential areas.

Issue 4: Visual Resource Impacts

Protecting the scenery of Santa Fe County is a key concern raised in the scoping process for Project Power. Concerns include sky lining of single pole double-circuit structures along ridges and near highway corridors and residences, and new switching facilities in residential areas. In addition, maintaining the rural character of existing and planned residential areas is of concern.

1.4.1.2 Issues Common to All Alternatives

Issue 5: Cumulative Effects Of Project Power

The possible combined effects of Project Power with other projects planned in the region were of concern to some residents.

Issue 6: Electro-Magnetic Fields

The noise and possible health-related effects were raised for the proposed transmission lines and switching stations.

1.4.2 Response to Scoping Issues

As a result of the concerns and issues that were expressed in the scoping process, PNM, in close coordination with the BLM and affected communities, developed eight new alternatives with a wider range of possible routes. These alternatives were analyzed as to their reasonableness, or ability to meet the purpose and need for the project. To be found reasonable, the alternative must:

- Increase electrical transmission capacity by 40 MW; and
- Be able to meet the planned in-service date of 2004 by:
  - Utilizing existing transmission lines and highway rights-of-way, and
  - Avoiding or minimizing conflicts with existing land uses, other incompatible locations (such as arroyos), and land use plans.

After eliminating the alternatives that did not meet these criteria, two of these new alternatives were selected for study in the EA, along with two of the original alternatives.

The four new alternatives are:

- **Norton to Zia North** – PNM's original Proposed Action, included due to BLM requirements.
- **Norton to Zia** – addresses Issues 2, 3, and 4.
- **Norton to Zia via Airport Road**– addresses Issue 1.
- **Norton to New Zia South to Zia** – addresses Issue 1.

Dropping Alternative E addresses Issues 2 and 3.

The details of the public participation activities are provided in Chapter 4.

1.5 Authorizing Actions Needed / Relationship to Plans and Regulations

Table 1-1 summarizes the federal, state, and local regulations and permits needed for this project. As part of the compliance with requirements of FLPMA, the BLM Taos Area Resource Management Plan was reviewed to evaluate whether the proposed action is consistent with the goals and purposes of that Plan.

Table 1-1. Summary of Potential Major Federal, State, Local, and Tribal Permits or Licenses and Other Environmental Review Requirements for Transmission Line Construction and Operation

Issue	Action Requiring Permit, Approval, or Review	Agency	Permit, License, Compliance or Review	Relevant Laws, Regulations, and Plans
FEDERAL				
NEPA Compliance	Federal; Action to grant right-of-way across land under Federal jurisdiction	**Lead Agency:** BLM **Applicant:** Public Service of New Mexico (PNM) **Cooperating Agency:** State of New Mexico **Reviewing Agencies:** City of Santa Fe and County of Santa Fe	EA and Decision Record	NEPA (42 UCS 4321) CEQ (40 CFR 1500-1508). DOI Planning Regulations (43 CFR 1600 Taos Resource Management Plan (1988)
Right-of-way across land under Federal Management	Preconstruction surveys; construction, operation, maintenance, and abandonment	BLM	Right-of-way grant and temporary use permit	Federal Land Policy and Management Act (FLPMA) of 1976 (PL 94-579) 43 USC 1761-1771 43 CFR 2800 Taos Resource Management Plan (1988)

Issue	Action Requiring Permit, Approval, or Review	Agency	Permit, License, Compliance or Review	Relevant Laws, Regulations, and Plans
FEDERAL (continued)				
Ground disturbance and water quality degradation	Construction sites with greater than one acre of land disturbance	Environmental Protection Agency (EPA)	Section 402 National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges from Construction Activities	Clean Water Act (33 USC 1342)
	Construction across water resources	Army Corps of Engineers (COE)	General easement	10 USC 2668 to 2669
	Crossing 100-year floodplain, streams, and rivers	COE	Floodplain use permits	40 USC 961
	Construction in or modification of floodplain	BLM	Compliance	Executive Order 11988 Floodplains
	Construction or modification of wetlands	BLM	Compliance	Executive Order 11990 Wetlands
	Potential discharge into water of the state (including wetlands and washes)	COE (and states); EPA on tribal lands	Section 401 permit	Clean Water Act (33 USC 1344)
	Discharge of dredge or fill material to watercourse	COE; EPA on tribal lands	404 Permit (individual or nationwide)	Clean Water Act (33 USC 1344)
	Potential pollutant discharge during construction, operation, and maintenance	EPA	Spill Prevention Control and Countermeasure (SPCC) Plan for switching stations	Oil Pollution Act of 1990 (40 CFR 112)
Biological Resources	Grant right-of-way by Federal land-managing agency	FWS	Endangered Species Act compliance by Federal land-managing agency and lead agency	Endangered Species Act of 1973 as amended (16 USC 1531 et seq)
	Protection of Migratory Birds	FWS	Compliance	Migratory Bird Treaty Act of 1918 16 USC 703-712, 50 CFR Ch 1
	Protection of bald and golden eagles	FWS	Compliance	Bald and Golden Eagle Protection Act of 1972 (16 USC 668)

Issue	Action Requiring Permit, Approval, or Review	Agency	Permit, License, Compliance or Review	Relevant Laws, Regulations, and Plans
FEDERAL (continued)				
Cultural Resources	Disturbance of historic properties	BLM, State Historical Preservation Officers (SHPO), Advisory Council on Historic Preservation	Section 106 consultation	National Historic Preservation Act of 1966 (16 USC 470) (36 CFR Part 800)
	Potential conflicts with freedom to practice traditional American Indian religions	BLM	Consultation with affected American Indians	American Indian Religious Freedom Act (42 USC 1996)
	Disturbance of graves, associated funerary objects, sacred objects, and items of cultural patrimony	BLM	Consultation with affected native American group regarding treatment of remains and objects	Native American Graves Protection and Repatriation Act of 1990 (25 USC 3001)
	Investigation of cultural and paleontological resources	BLM	Permit for study of historical, archaeological, and paleontological resources	Antiquities Act of 1906 (16 USC 432-433)
	Investigation of cultural resources	BLM	Permits to excavate and remove archaeological resources on Federal lands; American Indian tribes with interests in resources must be consulted prior to issuance of permits	Archaeological Resources Protection Act of 1979 (16 USC 470aa to 470ee) (43 CFR 7)
	Protection of segments, sites, and features related to national trails	BLM	National Trails Systems Act compliance	National Trails System Act (PL 90-543) (16 USC 1241 to 1249)
Paleontological Resources	Ground disturbance on Federal land or Federal aid project	BLM	Compliance with BLM mitigation and planning standards for paleontological resources of public lands	FLPMA of 1976 (43 USC 1701-1771) Antiquities Act of 1906 (16 USC 431-433)
Air Traffic	Location of towers in regards to airport facilities and airspace	Federal Aviation Administration (FAA)	A “No-hazard Declaration” required if structure is more than 200 feet in height	FAA Act of 1958 (49 USC 1501) (14 CFR 77)
			Section 1101 Air Space Permit for air space construction clearance	FAA Act of 1958 (49 USC 1501) (14 CFR 77)
Rate regulation	Sales for resale and transmission services	Federal Energy Regulatory Commission (FERC)	Federal Power Act compliance by power seller	Federal Power Act *(16 USC 792)*

Issue	Action Requiring Permit, Approval, or Review	Agency	Permit, License, Compliance or Review	Relevant Laws, Regulations, and Plans
STATE				
Right-of-way encroachment	Crossing state highways	New Mexico Department of Transportation	Utility permit	New Mexico Department of Highway rules and regulations
	Crossing state lands	New Mexico State Land Office	Right-of-way permit	State Lands Office Rule #10
	Notification	State Public Utility Commission	Rule 440 notification	New Mexico Statutes Annotated (NMSA) (1978 Compilation) Article 9-1 Sec 62-9-1 to 62-9-3
Ground disturbance and water quality degradation	100-year floodplain, streams and rivers, water of the state	New Mexico Environment Department	Floodplain use permits Clean Water Act 401, 402, and 404 permits	New Mexico Statutes – State Water Quality Certification rules
Cultural Resources	Construction and operation	Office of Historic Preservation	Section 106 consultation	National Historic Preservation Act of 1966 (16 USC 470) Advisory Council on Historic Preservation Regulations (36 CFR 800)
	Investigation of cultural resources on state lands	New Mexico Cultural Properties Review Committee	Permits to conduct archaeological survey or excavation	New Mexico Cultural Properties Act (NMSA 18-6-1 to 18-6-17) (1978 Compilation)
	Disturbance of human burials on non-Federal or non-Indian lands in New Mexico	New Mexico Cultural Properties Review Committee	Human burial excavation permit	New Mexico Cultural Properties Act (NMSA 18-6-11) (1978 Compilation)
Biological Resources	Ground disturbance in areas with New Mexico state sensitive plant species	New Mexico Department of Energy, Minerals, and Natural Resources	Permit	New Mexico Endangered Plant Species Act (NMSA 9-10-10)
	Habitat modifications in areas of New Mexico state sensitive animal species	New Mexico Department of Game and Fish	Permit	New Mexico Wildlife Conservation Act (NMSA 17-2-37 to 17-2-46)

Issue	Action Requiring Permit, Approval, or Review	Agency	Permit, License, Compliance or Review	Relevant Laws, Regulations, and Plans
COUNTY				
Site Development	Switching Station Development/Construction (Zia North)	Agua Fria Development Review Committee (AFDRC) Santa Fe County Development Review Committee (CDRC) Santa Fe County Extraterritorial Zoning Committee (EZC) Santa Fe County Extraterritorial Zoning Authority (EZA) Santa Fe County Board of County Commissioners (BCC)	Development Plan	Santa Fe County Land Development Code
Site Development	Switching Station Development/Construction (Zia South)	Community College Development Review Committee (CCDRC) Santa Fe County Development Review Committee (CDRC) Santa Fe County Extraterritorial Zoning Committee (EZC) Santa Fe County Extraterritorial Zoning Authority (EZA) Santa Fe County Board of County Commissioners (BCC)	Development Plan	Santa Fe County Land Development Code
Linear Utility Development	Transmission Line development/construction (A, F, O or S)	Agua Fria Development Review Committee (AFDRC) or Community College Development Review Committee (CCDRC) Santa Fe County Development Review Committee (CDRC) Santa Fe County Extraterritorial Zoning Committee (EZC) Santa Fe County Extraterritorial Zoning Authority (EZA) Santa Fe County Board of County Commissioners (BCC)	Development Plan; Variances: increased height and overhead	Santa Fe County Extraterritorial Zoning Ordinance

Issue	Action Requiring Permit, Approval, or Review	Agency	Permit, License, Compliance or Review	Relevant Laws, Regulations, and Plans
COUNTY (continued)				
Right-of-way encroachment	Road crossing Paralleling road right-of-way (O & S)	Santa Fe County Public Works Dept. NMSHTD	Utility work Permit Right-of-way easement	Does not require county approval in state highway ROW
CITY				
Linear Utility Development	Transmission Line construction (A, S, & O)	City of Santa Fe – Planning Commission City of Santa Fe – City Council	Site development plan and Consistency Review with City of Santa Fe General Plan	City of Santa Fe General Plan
Right-of-way encroachment	Road crossing Paralleling road right-of-way (O)	City of Santa Fe Public Works Dept. NMSHTD	Utility work Permit Right-of-way easement	City Rules and Regulations

Chapter 2. Alternatives

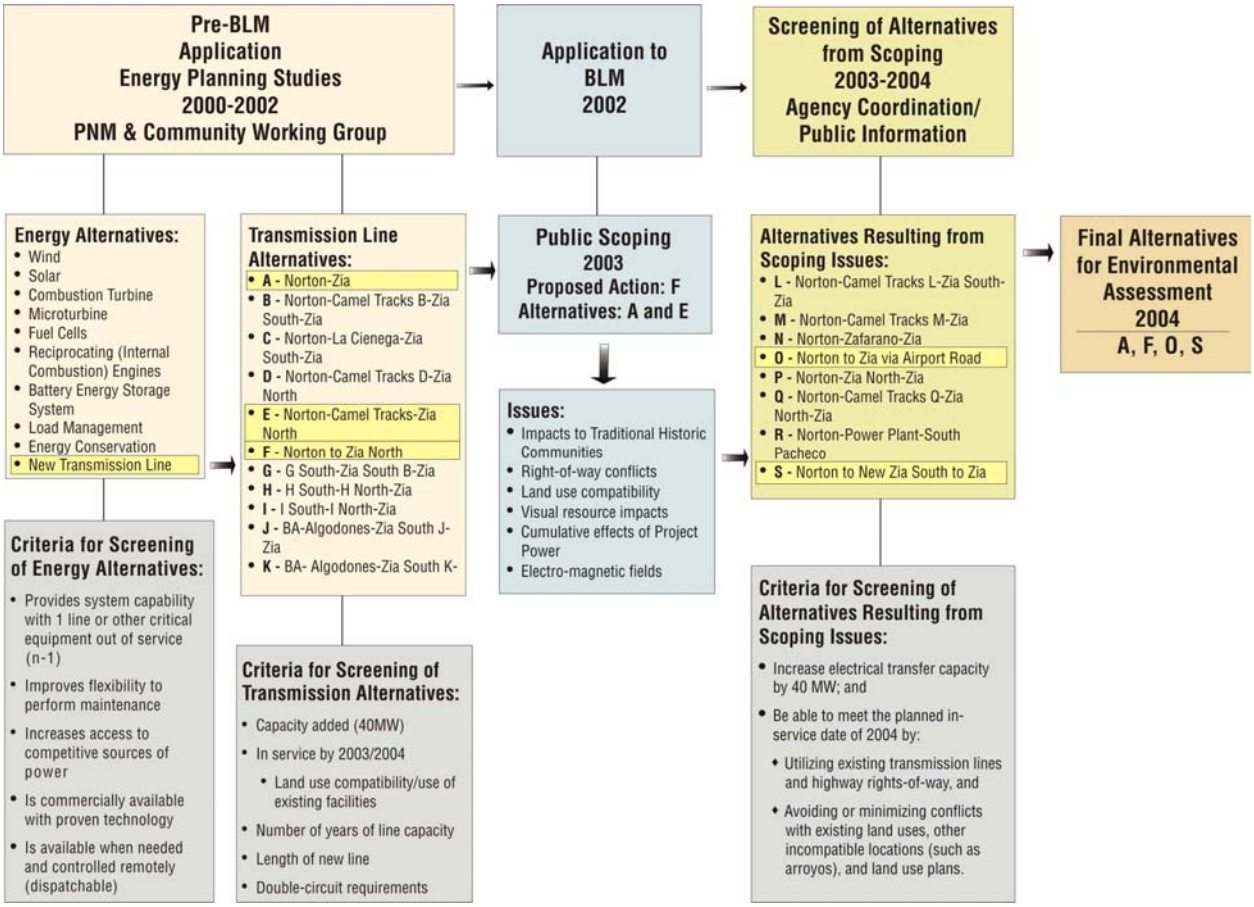
This chapter describes the alternatives considered for PNM's **Project Power: New 115kV Transmission Line and Facilities in the Santa Fe Area.** Four action alternatives and the No Action alternative are described in detail and analyzed in this EA. This chapter contains the following sections:

- Section 2.1 explains the screening process that was used to reach these four action alternatives.
- Section 2.3 describes all four action alternatives and No Action.
- Section 2.4 details the alternatives' transmission line facilities, including structures and switching stations.
- Section 2.5 outlines the assumptions for the action alternatives, including right-of-way, structure locations and access, pulling sites, and use of fiber optic shield wire.
- Section 2.6 discloses construction activities and specifications.
- Section 2.7 describes mitigation measures to be taken for each action alternative.
- Section 2.8 contains the comparison of alternatives.

2.1 Alternatives Screening

The process of screening the alternatives for this project is illustrated in Figure 2-1.

Figure 2-1. Project Power Alternatives Screening



2.1.1 Overview of Screening Process

In 2001, PNM began a series of **energy planning studies** in coordination with community members, elected officials, state and local government agency representatives, business owners, large power users, community advocates, alternative energy advocates, environmental advocates, and land developers.

Working with these community representatives and with various energy specialists, PNM evaluated several **preliminary energy alternatives** as to their potential to solve the energy problem by winter 2003-2004, or to provide long-term solutions. While it was agreed that the renewable energy alternatives should be retained for long-term study, only the **transmission** alternative met both the short- and long-term criteria of this project. Development of a new 115kV transmission line interconnecting with the existing Zia Switching Station would provide for the area's projected electric power needs, as well as solving the reliability issues anticipated in the 2003-2004 time frame.

Eleven possible transmission line route options, Alternatives A through K, were developed and studied, then narrowed down to three alternatives (A, E, and F) that best maximized the use of existing transmission corridors. All three options would rebuild or double-circuit existing transmission lines, with Alternative E requiring a new line section. The three options called for upgrade or retrofit of existing stations, and/or construction of new switching stations or substations. They all were based around the existing Zia Switching Station (with retrofit) or a planned Zia North Switching Station.

Alternatives A, E, and F, along with the other alternatives, were presented to the public at seven scoping meetings held between May and August 2003, with Alternative F presented as the Proposed Action in accordance with the Bureau of Land Management's process. As a result of the concerns that were presented by the community during the scoping process, Alternative E was dropped, and eight new alternatives (L through S) were developed with community input. Alternative F, while raising concerns among the community, was required to remain the Proposed Action. The new alternatives were analyzed as to their reasonableness, and alternatives that did not meet the purpose and need of the project were eliminated.

This alternatives screening process culminated in the selection of Alternatives A, F, O, and S for detailed study in the EA.

The screening results summary for all of the transmission line alternatives is shown in Figure 2-2.

2.1.2 Energy Alternatives Screening

Several energy alternatives were evaluated by PNM and its community working group. Below is a list of the energy alternatives that were evaluated, along with the reason each energy alternative was selected or screened out.

- **No action –** Alternative will be studied in the EA, due to NEPA requirements.
- **Renewable resource generation**
  - **Wind** – No suitable sites are close to Santa Fe area; implementation is not possible within time constraints; the alternative is retained for long-term consideration.

  - **Solar** – No suitable sites are close to the area; implementation is not possible within time constraints; the alternative is retained for long-term consideration.
- **Distributed generation** (grid-connected, dispatchable)
  - **Micro turbines –** This is an emerging technology; PNM has developed a microturbine demonstration project to test it. The alternative is not currently available to meet area needs.
  - **Fuel cells** – The alternative is not commercially available.
  - **Reciprocating (internal combustion) engines –** Due to technical and regulatory issues and market uncertainty, small customer-owned generators are not a practical solution for meeting forecasted requirements.
  - **Battery energy storage system -** The technology is not currently available to build large-scale battery energy storage units that operate for long periods of time.
- **Demand-side energy management alternatives -** Energy conservation and load management programs alone cannot compensate for the forecasted deficiencies in the Santa Fe/Las Vegas area in either the short or long term. These options, in combination with other alternatives, will be explored and developed more fully for future use.
- **Conventional generation alternatives**
  - **Combustion turbines**
  - **Upgrade Las Vegas turbine**

  PNM's advisory committees agreed that these conventional generation options were the least desirable of the alternatives. Implementation of a conventional generation alternative would promote increased use of and reliance on fossil fuels and result in continued depletion of those resources, as well as continued pollution.
- **Transmission alternatives –** This alternative was selected for further study.

2.1.3 Transmission Line Alternative Route Screening

PNM identified eleven possible transmission alternatives, labeled A through K, for evaluation in conjunction with its community working group. They selected three alternatives for further study – A, E, and F – all of which aligned with existing corridors and facilities. Alternative F was designated as The Proposed Action.

These three alternatives, along with the other alternatives that had been considered, were presented at seven public scoping meetings held between May and August 2003. Several concerns were raised during scoping, particularly pertaining to the Proposed Action, Alternative F. As a result of these concerns, eight new alternatives – L through S –were developed; several of these were directly suggested by the public and refined by PNM.

A screening process was then applied to all the alternatives – A through S – to identify the most reasonable alternatives to be carried into detailed analysis in the EA. The screening criteria were as follows:

- Increase electric transfer capacity of the transmission system serving Santa Fe and Las Vegas by 40 MW
- Have the capability of meeting the planned in-service date of 2004 by:

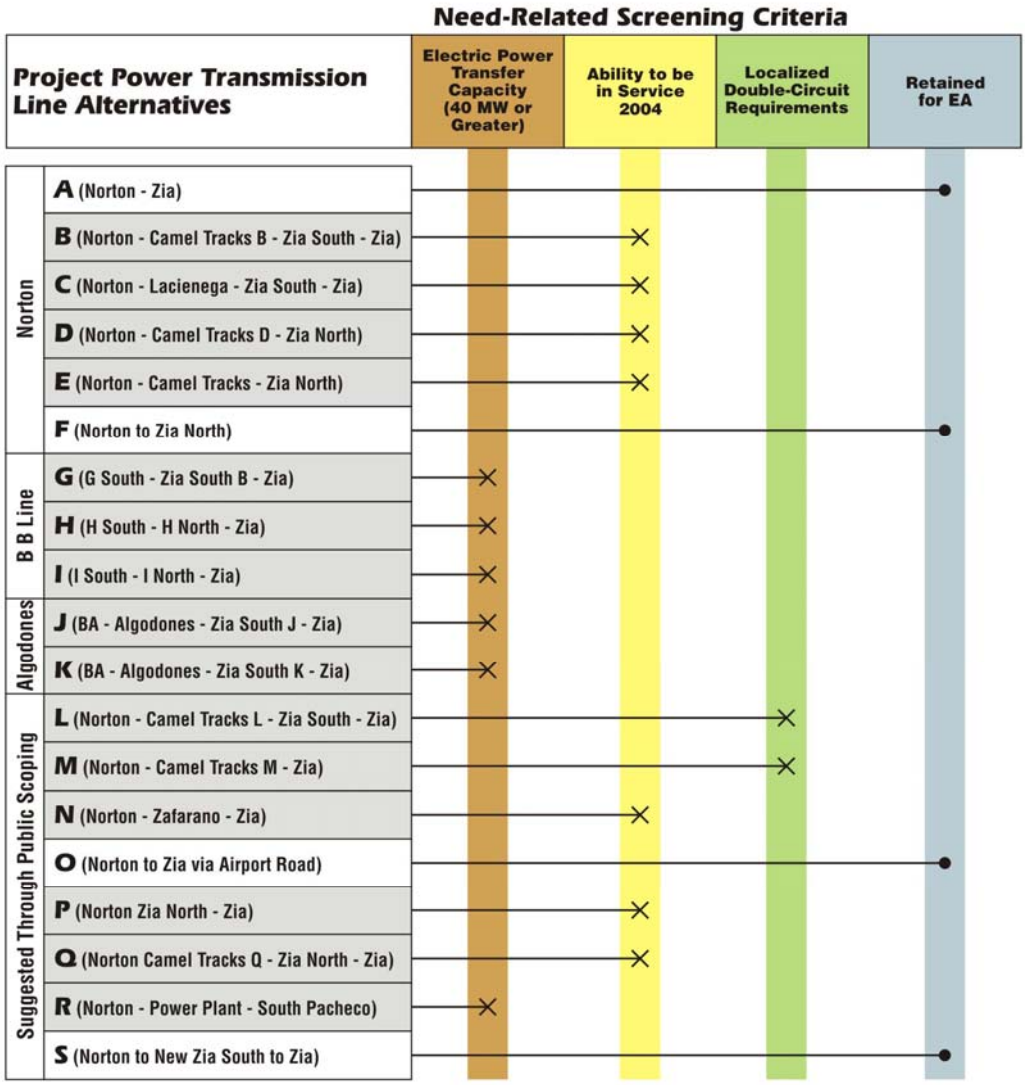
- Utilizing existing transmission lines, highway rights-of-way, and parallel existing roads and highways
- Avoiding or minimizing conflicts with existing land uses, other incompatible locations (such as arroyos), and land use plans.

Alternatives G through K were removed from consideration due to not meeting power source requirements. The remaining alternatives and their rationale for selection are described on Table 2-1.

Of alternatives A through S, three – **A, O,** and **S** – were identified as best meeting the purpose and need for the project. They also addressed a number of the issues raised during scoping. Alternative **F,** as the initial Proposed Action, is also analyzed in this EA due to BLM's NEPA process requirements.

Summary results of this screening are displayed in Figure 2-2.

Figure 2-2. EA Screening Results Summary for Transmission Line Alternatives



2.2 Alternatives Considered but Dropped from Detailed Analysis

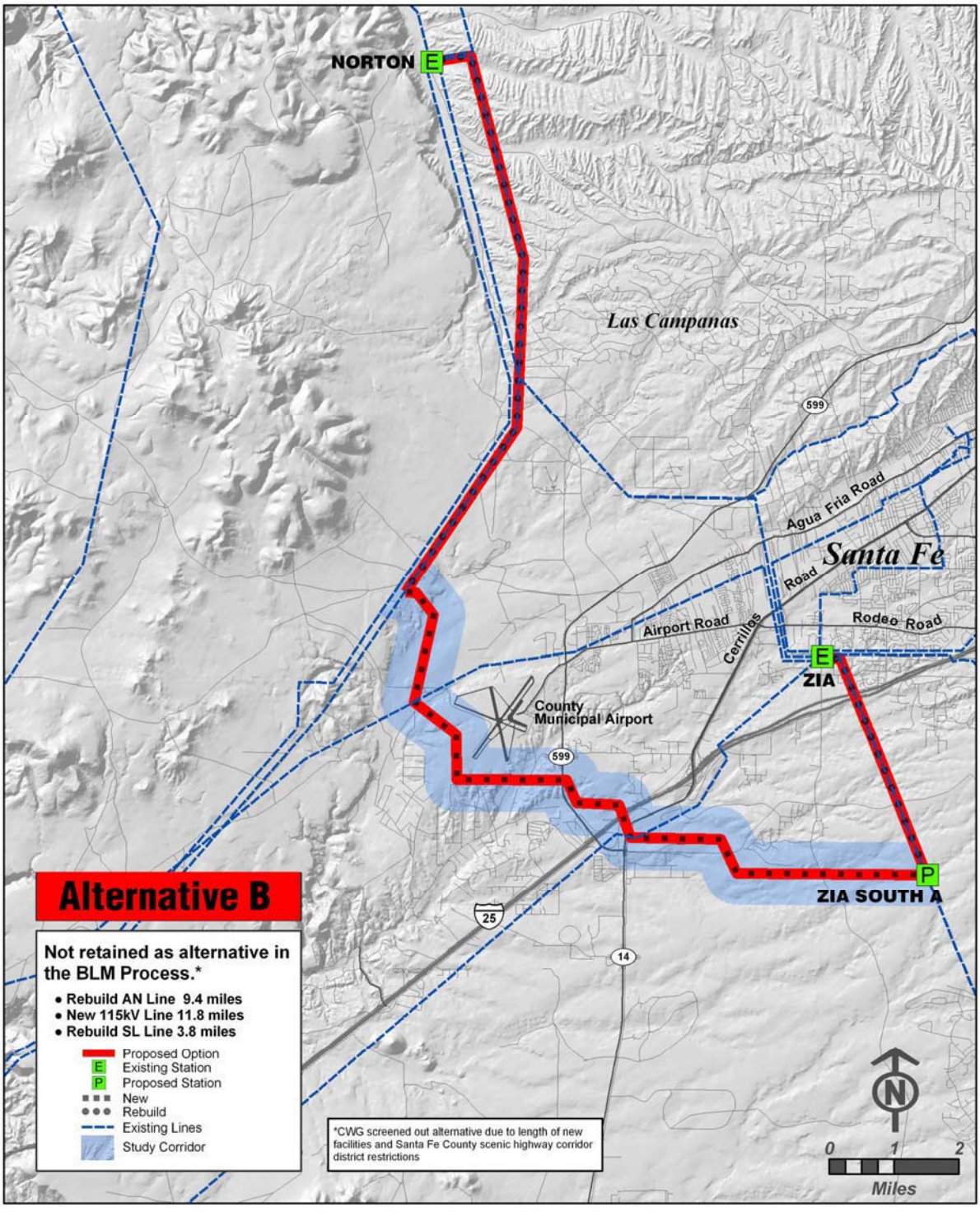
Table 2-1 gives details of the alternatives that were dropped from detailed analysis and the rationale for screening out each of them. Due to their poor technical performance, alternatives G, H, I, J, and K were not analyzed further and are not included on the table. However, they are shown in a series of maps following the table, which show the routes followed by each of the dropped alternatives.

Table 2-1. Transmission Alternatives Screening

Alternative Dropped	Description	Land Use Setting	Electric Transfer Capacity (40 MW or Greater)	Ability to Meet In Service Date of 2004		Retained for Analysis in EA	
				Utilizing existing Transmission Line or Highway/Road Route	Existing and Planned Land Use Compatibility	Yes / No	Rationale
B	**Total length:** 25.0 miles **Miles of new line:** 11.8 miles **Miles of rebuild:** 13.2 miles **Miles of double circuit:** 0 miles **Summary:** 47% new line, 53% rebuild, 0% double circuit	• Alternative includes one new switching station east of Rancho Viejo, southeast of the existing Zia Switching Station along the SL line. • Has the added benefit to PNM of providing 115kV transmission to areas south of I-25 near the Rancho Viejo and San Cristobal developments. • A portion of new line corridor lies along the eastern edge of the La Cienega Traditional Historic Community boundary. • Alternative is similar to Alternatives C, S and L, though this alternative includes only one new switching station.	40+ MW	10.0 miles not contained in existing rights-of-way	• New line through existing and developing residential areas with limited road right-of-way for siting line. • Possible conflicts with residential and open space areas in Rancho Viejo. • Two miles of new line through Community College District.	No	The alternative crosses through the La Cienega THC, a portion of the alternative is not contained in existing rights-of-way, and the alternative is similar to retained Alternative S.
C	**Total length:** 38.7 miles **Miles of new line:** 15.0 miles **Miles of rebuild:** 23.7 miles **Miles of double circuit:** 0% **Summary:** 39% new line, 61% new line	• Alternative includes one new switching station southeast of the existing Zia Switching Station, east of Rancho Viejo along the existing SL line. • Crosses through 4.5 miles of the La Cienega Traditional Historic Community with new 115kV single pole line. • Rebuild of AN line runs adjacent to 5.5 miles of the La Cienega Traditional Historic Community boundary. • Has the added benefit to PNM of providing 115kV transmission to areas south of I-25 near the Rancho Viejo and San Cristobal developments. • Alternative is similar to Alternatives C, S and L.	40+ MW	13.0 miles not contained in existing rights-of-way	• Crosses through 4.5 miles of the La Cienega Traditional Historic Community (THC) with new single pole line.	No	The alternative crosses through the La Cienega ACEC and La Cienega THC and contains new line not in existing rights-of-way.
D	**Total length:** 23.7 miles **Miles of new line:** 0 miles **Miles of rebuild/reconductor:** • 14.1 miles of AN line rebuild (H-frame) • 9.6 miles of reconductoring ZB line **Miles of double circuit:** 0 miles **Summary:** 0% new line, 59% rebuild, 61% reconductor, 0% double circuit	• Alternative includes two new switching stations, one at the intersection of the ZB and AN lines and one in the Agua Fria Traditional Historic Community (THC). • Alternative includes two portions of rebuild though the BLM La Cienega Area of Critical Environmental Concern (ACEC) • Alternative requires no new transmission corridor. • The rebuild of the ZB portion of the alternative is adjacent to the Las Acequias, Cottonwood Village, Tiempo Lindo, Fairway Village, Country Club Gardens, and Tierra Real neighborhoods.	40+ MW	Entire route	• Crosses through the BLM La Cienega Area of Critical Environmental Concern (ACEC) with rebuilt H-frame structures. • Includes a new switching station in the Agua Fria THC.	No	The alternative crosses through the La Cienega ACEC and includes a new switching station in the Agua Fria THC.
E	**Total length:** 17.5 miles **Miles of new line:** 2.2 miles **Miles of rebuild/reconductor:** • 9.4 miles of AN line rebuild (H-frame) • 5.9 miles of reconductoring ZB line **Miles of double circuit:** 0 miles **Summary:** 12% new line, 54% rebuild, 34% reconductor, 0% double circuit	• Alternative includes one new switching station in the Agua Fria Traditional Historic Community. • Alternative is similar to Alternatives D and Q. • The rebuild of the ZB portion of the alternative is adjacent to the Las Acequias, Cottonwood Village, Tiempo Lindo, Fairway Village, Country Club Gardens, and Tierra Real neighborhoods.	40+ MW	2.2 miles not in existing rights-of-way	• New switching station in Agua Fria Traditional Historic Community. • Additional right-of-way required through 5.9 miles of existing residential and commercial development along ZB line.	No	The alternative includes a new switching station in Agua Fria THC and includes new line not contained in existing rights-of-way.

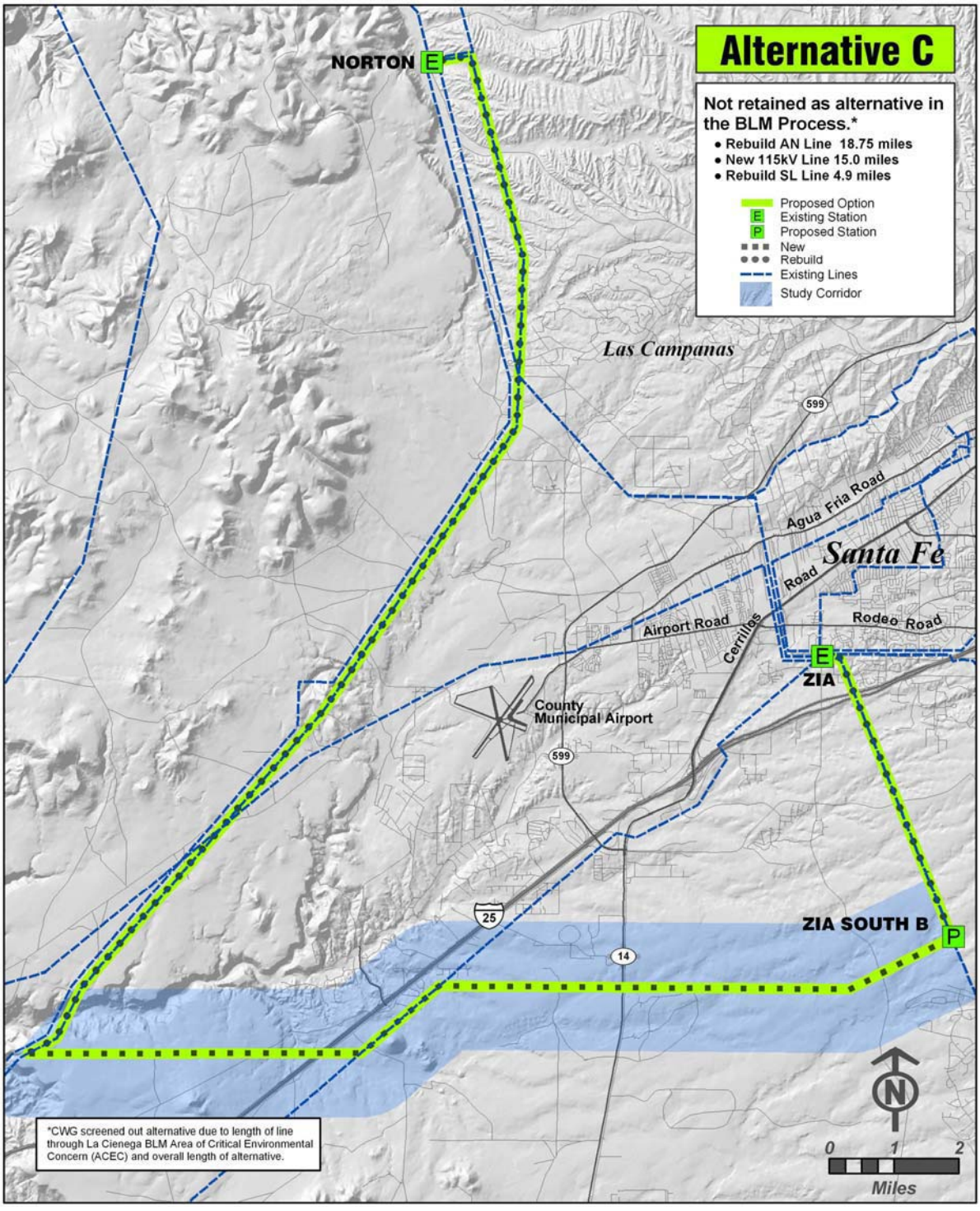
Alternative Dropped	Description	Land Use Setting	Electric Transfer Capacity (40 MW or Greater)	Ability to Meet In Service Date of 2004		Retained for Analysis in EA	
				Utilizing existing Transmission Line or Highway/Road Route	Existing and Planned Land Use Compatibility	Yes / No	Rationale
L	**Total length:** 22.7 miles **Miles of new line:** 12.7 miles **Miles of rebuild:** 9.0 miles • 5.2 miles of AN line (H-frame) • 3.8 miles of SL line (H-frame) **Miles of double circuit:** 1.0 mile of NZ line (H-frame to Single-pole) **Summary:** 56% new line, 40% rebuild, 4% double circuit	• Crosses through 7.0 miles of the Santa Fe Community College District. • Includes two new switching stations, one north of Airport Road, one east of Rancho Viejo along the existing SL line. • Has the added benefit to PNM of providing 115kV transmission to areas south of I-25 near the Rancho Viejo and San Cristobal developments. • Alternative suggested by Agua Fria Community in coordination with Santa Fe County Land Use Department.	48 MW	8.9 miles not in existing rights-of-way or paralleling roads	• Possible conflicts with residential and open space areas in Rancho Viejo. • 3.5 miles of new line through Community College District.	No	Similar to Alternative S, which was retained; however, this line includes double circuit on the NZ line, which is preferable to avoid where possible to increase reliability.
M	**Total length:** 14.2 miles **Miles of new line:** 7.2 miles (Single-pole) **Miles of rebuild:** 5.2 miles of AN (H-frame) **Miles of double circuit:** 1.8 miles of NZ line (H frame to Single-pole) **Summary:** 51% new line, 36% rebuild, 13% double circuit	• New corridor along Airport Road is adjacent to Vista Primera, Vista Verde Mobile Home, Cedar Creek Apartments, Country Club Estates, Tierra Real Mobile Home, Country Club Estates, Country Club Apartments, West Meadow, Jemez Road, Rancho Zia Mobile Home Park, Vereda de Valancia, Villitas Mobile Home Park, and Cedar S Mobile Home Subdivisions. • Includes new ROW acquisitions and one new switching station north of Airport Road. • Airport Road section is in an existing distribution line ROW. • Alternative suggested by public.	47 MW	1.9 miles not in existing rights-of-way or paralleling roads	• Requires local siting along Airport Road.	No	Similar to retained Alternative O; however, this includes double circuit on the NZ line.
N	**Total length:** 12.7 miles **Miles of new line:** 0 **Miles of rebuild:** 5.2 miles of AN (H-frame) **Miles of double circuit:** 7.5 miles of NZ line (H-frame to single-pole) **Summary:** 0% new line, 41% rebuild, 59% double-circuit	• Alternative requires no new transmission corridor. • Includes one new switching station east of the existing Zia Switching Station off Zafarano Road, south of the Villa Linda Mall • Alternative is similar to Alternatives A, F, and P. • The double circuit portion of the alternative along the NZ line runs adjacent to the Peustas Del Sol and Piñon Hills neighborhoods. • Alternative suggested by public.	48 MW	Entire Route	• Includes new switching station 0.7 miles from the existing Zia Switching Station south of Villa Linda Mall in an arroyo.	No	The alternative includes construction of a switching station in an arroyo, an incompatible switching facility location.
P	**Total length:** 12.7 miles **Miles of new line:** 0 **Miles of rebuild:** 5.2 miles of AN (H-frame) **Miles of double circuit:** 7.5 miles of NZ line (H-frame to Single-pole) **Summary:** 0% new line, 41% rebuild, 59% double circuit	• Includes new switching station north of Cerrillos Road. • Alternative is similar to Alternatives A, F, and N. • Alternative requires no new transmission corridor. • The double circuit portion of the alternative along the NZ line runs adjacent to the Peustas Del Sol and Piñon Hills neighborhoods. • Alternative suggested by public.	47 MW	Entire Route	• Includes new switching station north of Cerrillos Road in residential area.	No	The alternative is similar to retained Alternative A, but adds a switching station in an incompatible land use area north of Cerrillos Road.

Alternative Dropped	Description	Land Use Setting	Electric Transfer Capacity (40 MW or Greater)	Ability to Meet In Service Date of 2004		Retained for Analysis in EA	
				Utilizing existing Transmission Line or Highway/Road Route	Existing and Planned Land Use Compatibility	Yes / No	Rationale
Q	**Total length:** 17.3 miles **Miles of new line:** 1.8 miles (single-pole) **Miles of rebuild:** • 9.0 miles of AN (H-frame) • 4.5 miles of ZB (single-pole) **Miles of double circuit:** 2.0 miles of NZ line (H-frame to single-pole) **Summary:** 10% new line, 78% rebuild, 12% double circuit	• Rebuild through existing ZB corridor requires new ROW and lies adjacent to the Las Acequias, Cottonwood Village, Tiempo Lindo, Fairway Village, Tierra Real, and Tierra Madre neighborhoods. • The double circuit portion of the alternative along the NZ line runs adjacent to the Peustas Del Sol and Piñon Hills neighborhoods. • Includes new line and two new switching stations, one north of Santa Fe Airport and one off Cerrillos Road. • Alternative suggested by public.	47 MW	1.8 miles not in existing rights-of-way	• New switching station north of Cerrillos Road in residential area. • Additional right-of-way required through 4.5 miles of existing residential and commercial development along ZB line.	No	The alternative includes new line not contained in existing rights-of-way.
R	**Total length:** 13.9 miles **Miles of new line:** 4.2 miles (Single-pole) **Miles of rebuild:** 5.2 miles of AN (H-frame) **Miles of double circuit:** 4.5 miles of NZ line (H-frame to single-pole) **Summary:** 30% new line, 38% rebuild, 32% double circuit	• Includes new line northeast and south of the Power Plant Switching Station through the Torreon, La Madera, San Salvador, Las Lomas, Barrio La Canada, Camino La Canada, Sierra Vista, Don Diego, Rio Vista, San Mateo, Arroyo Chamiso, and Tierra Madre neighborhoods. • Does not include a new switching station or substation. • Utilizes the existing ZN line with no rebuild required towards the existing Power Plant switching station. • Provides the added benefit of bringing additional 115kV line into the downtown Santa Fe area, a component of PNM's 10-year plan. • Alternative suggested by public.	31 MW	Entire Route	Not further evaluated because it does not meet 40 MW requirement.	No	Does not meet 40MW need.



PROJECT POWER

Transmission Line Alternatives
Studied and Eliminated from Further Consideration



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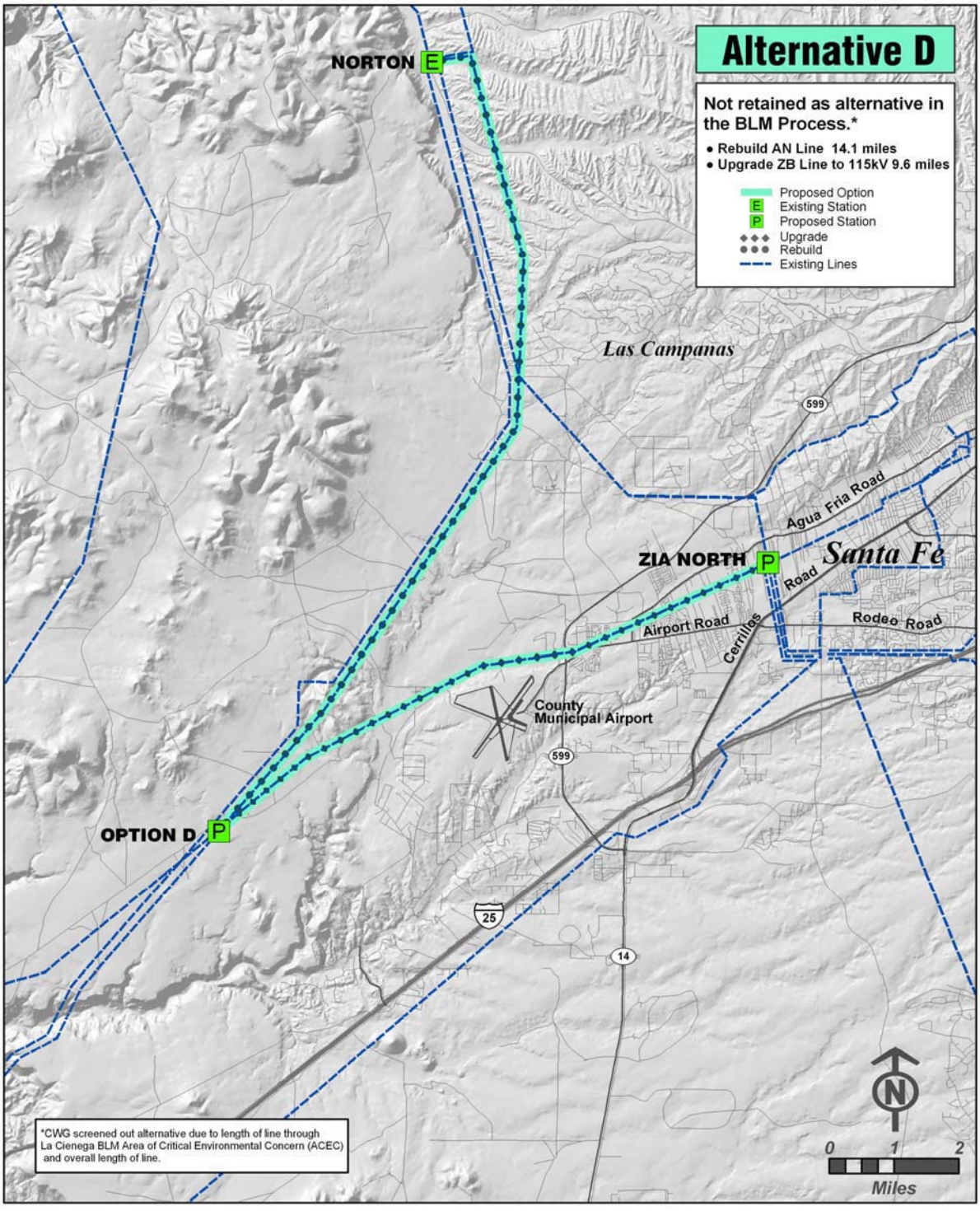

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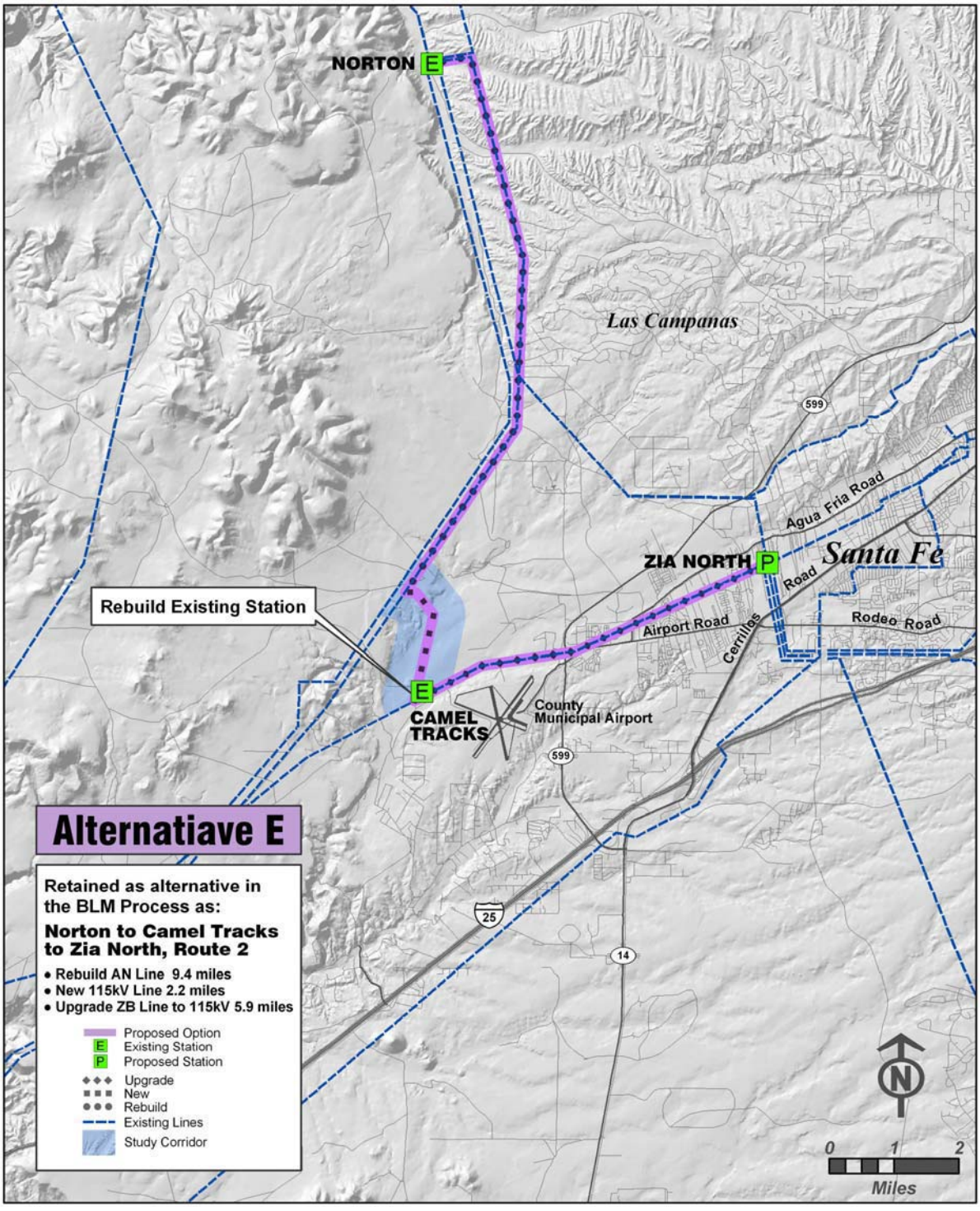

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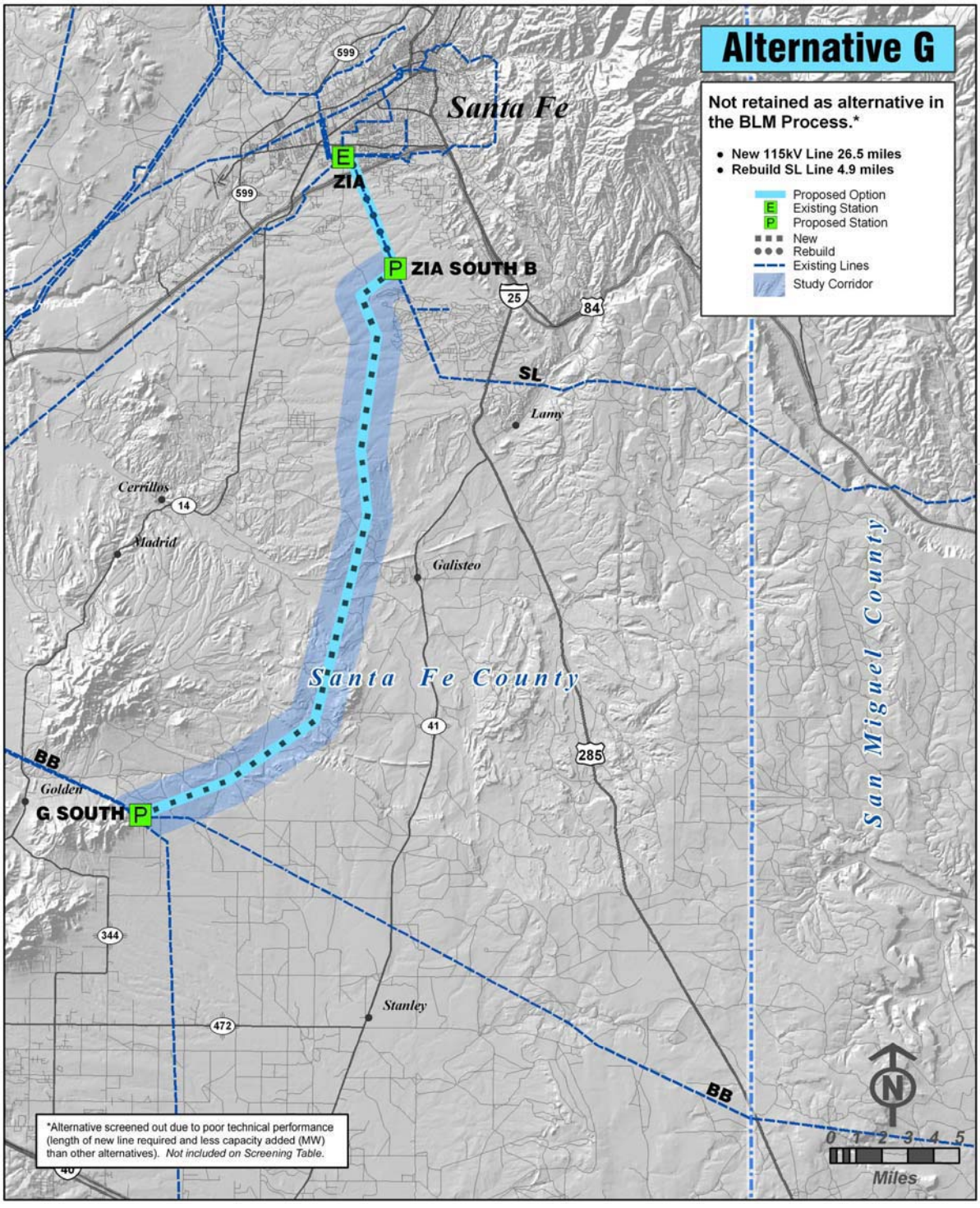

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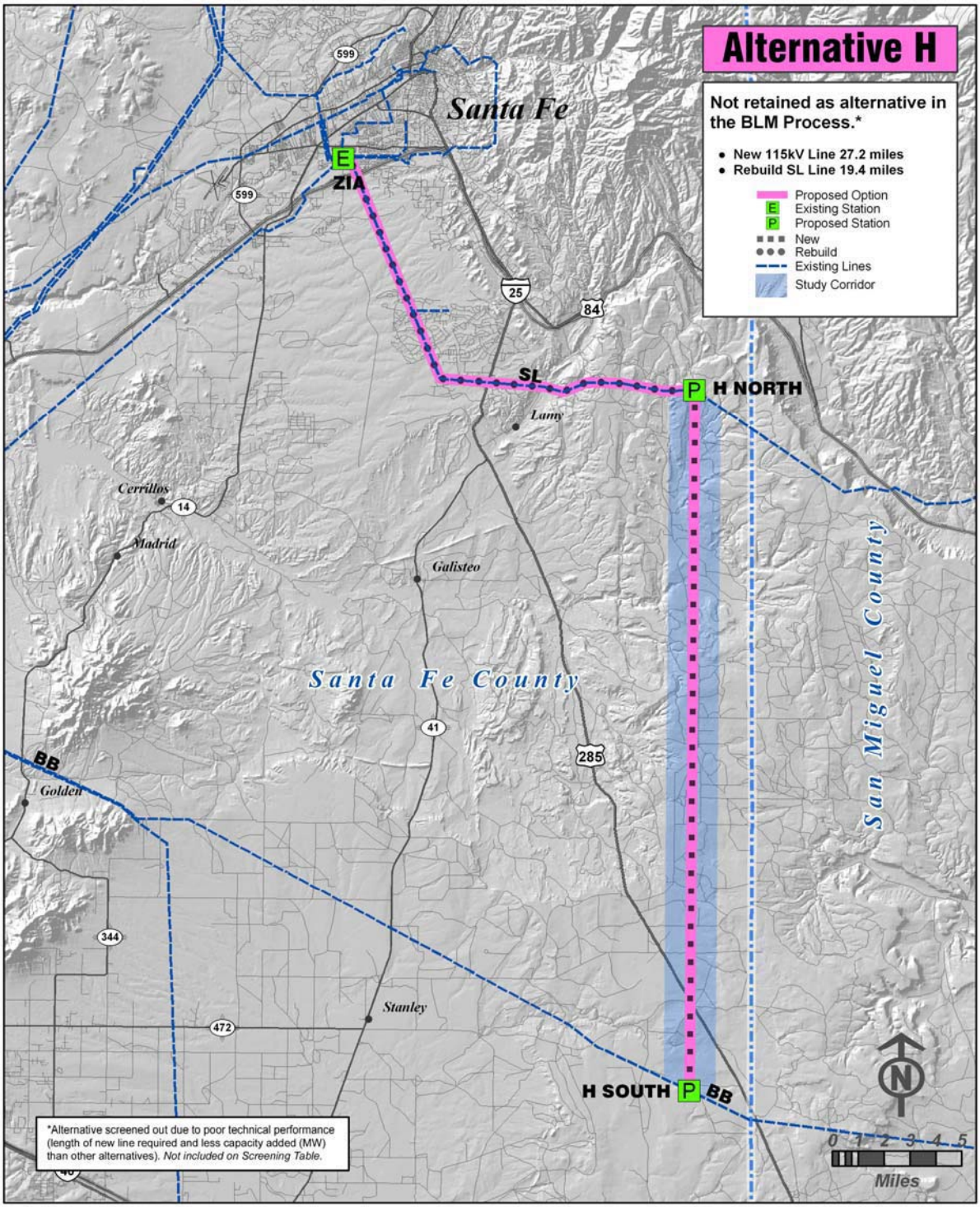

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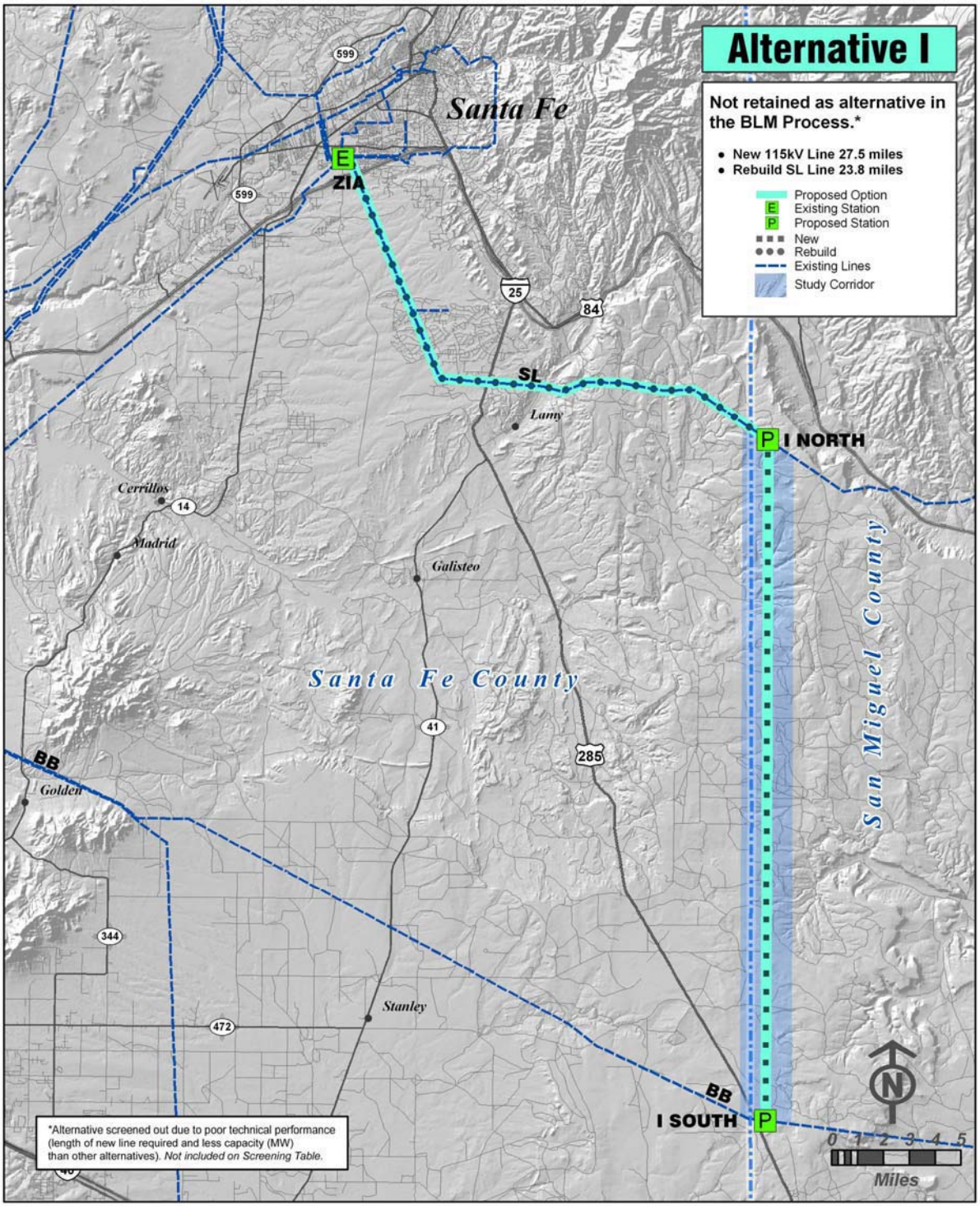

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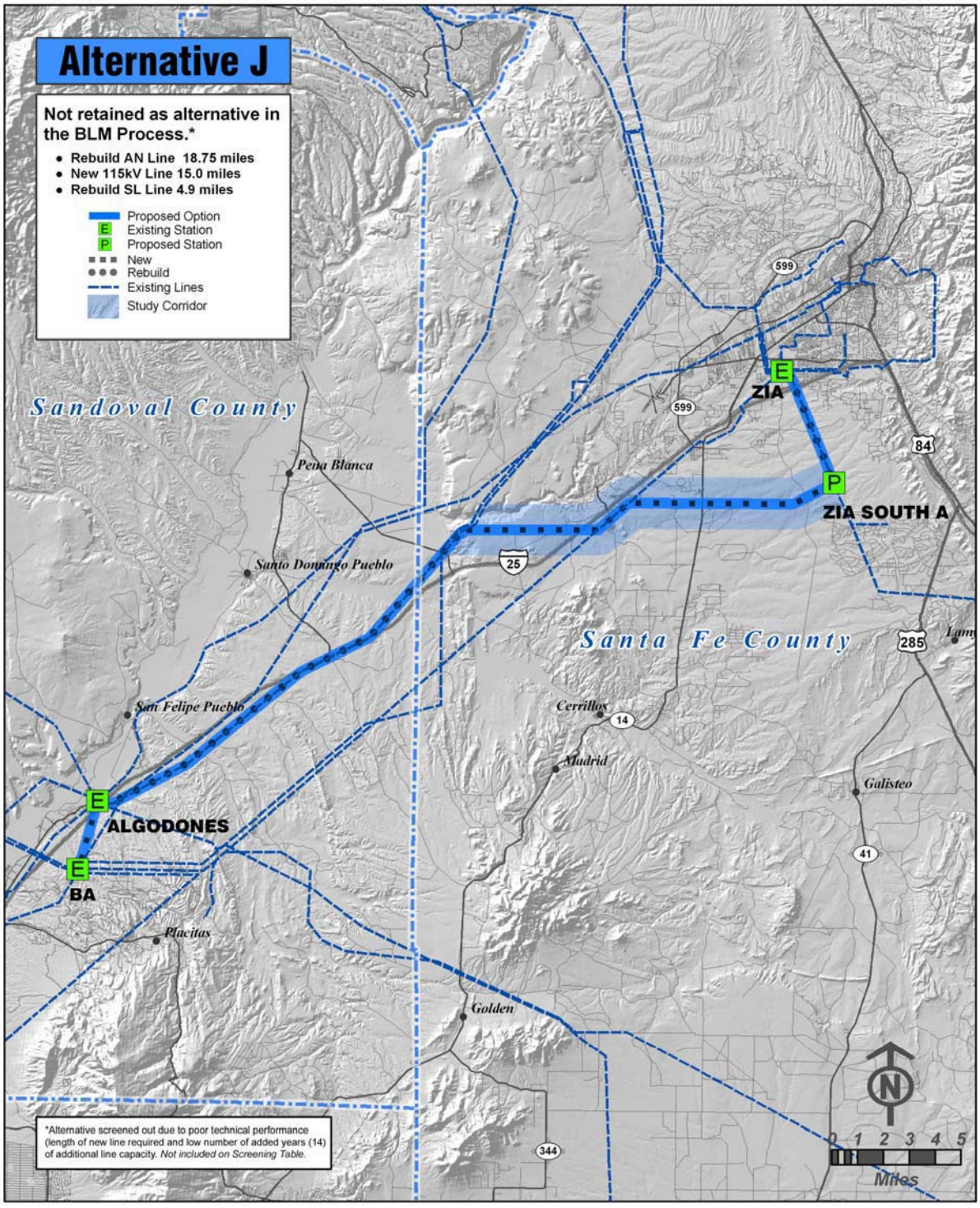

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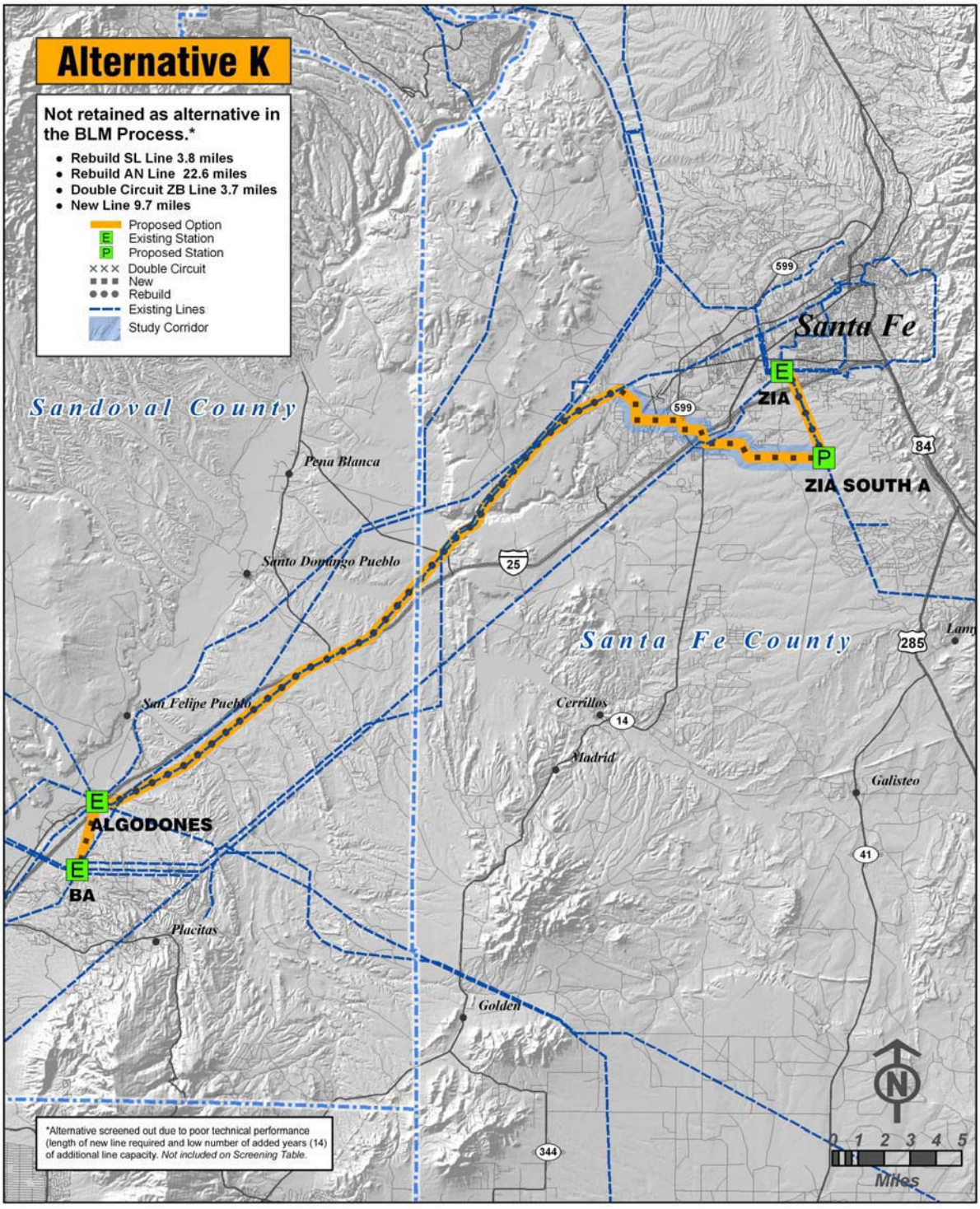

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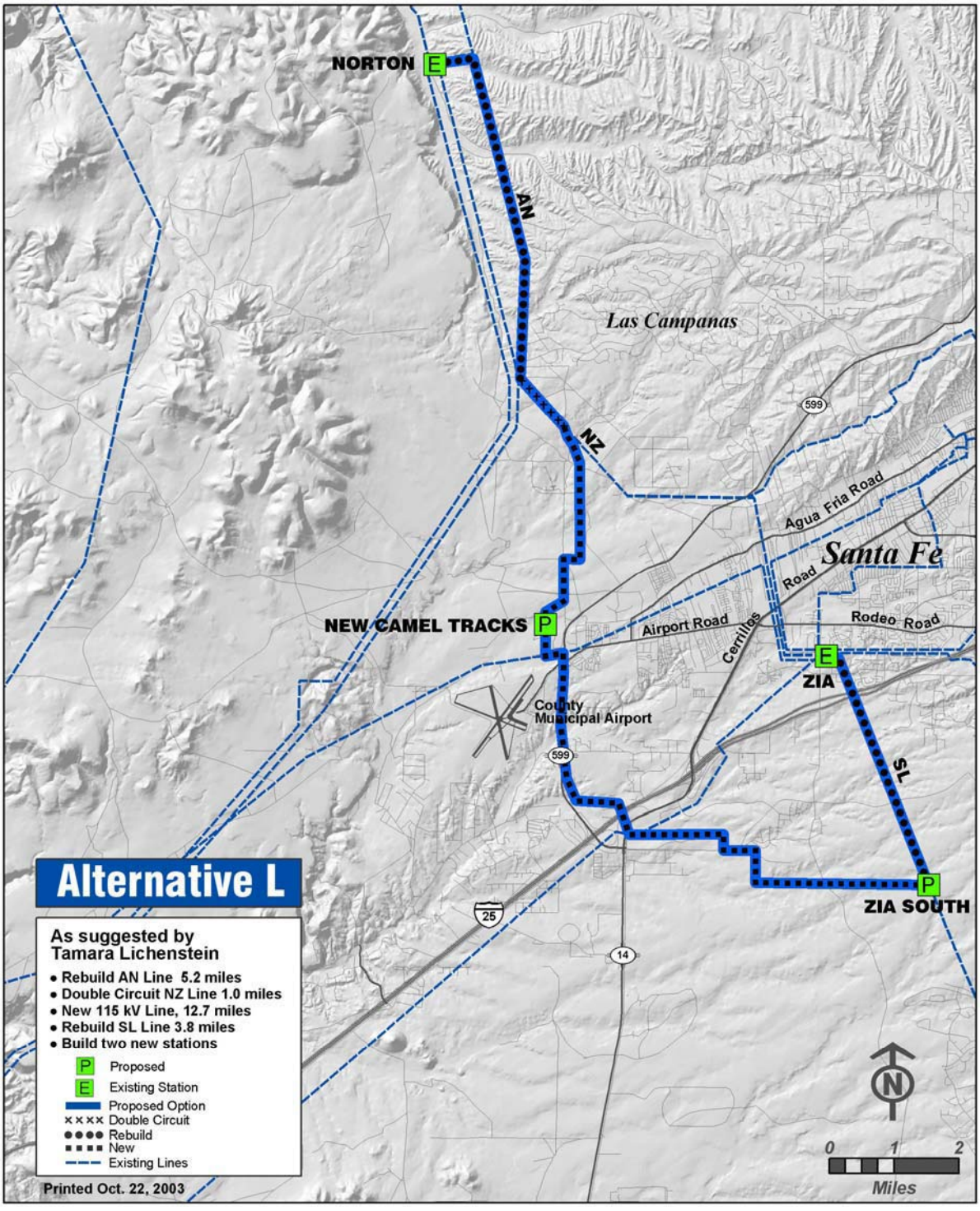

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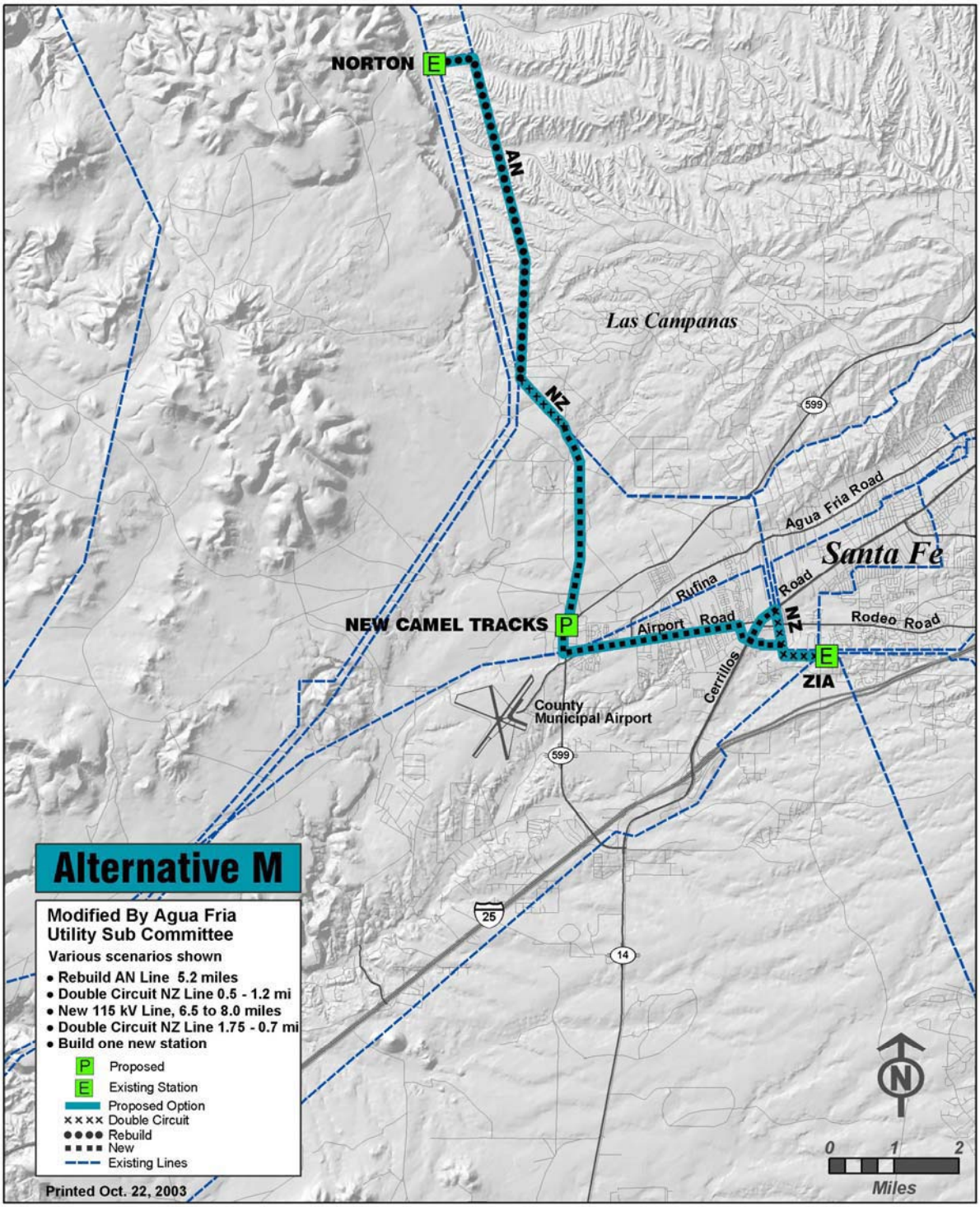

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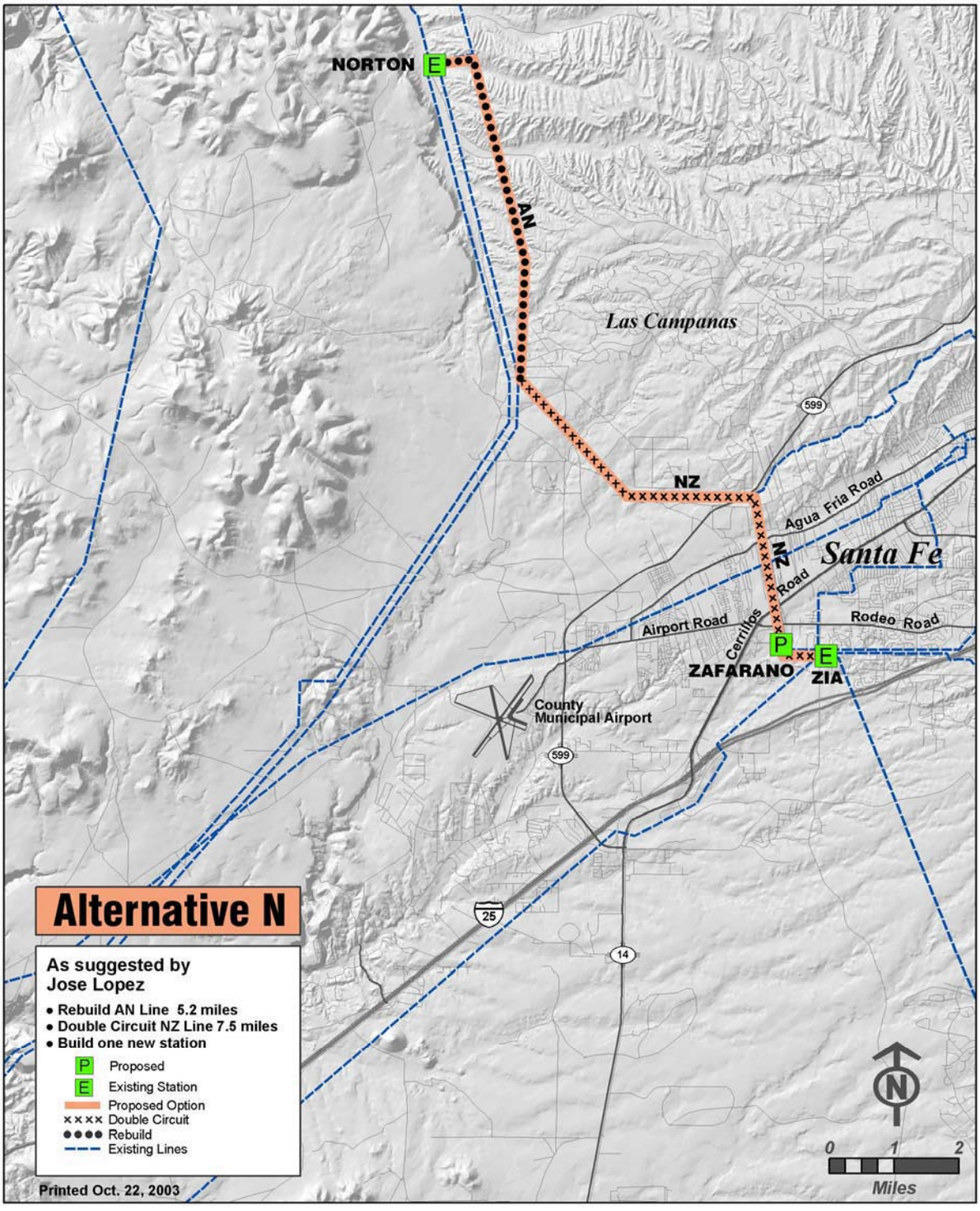

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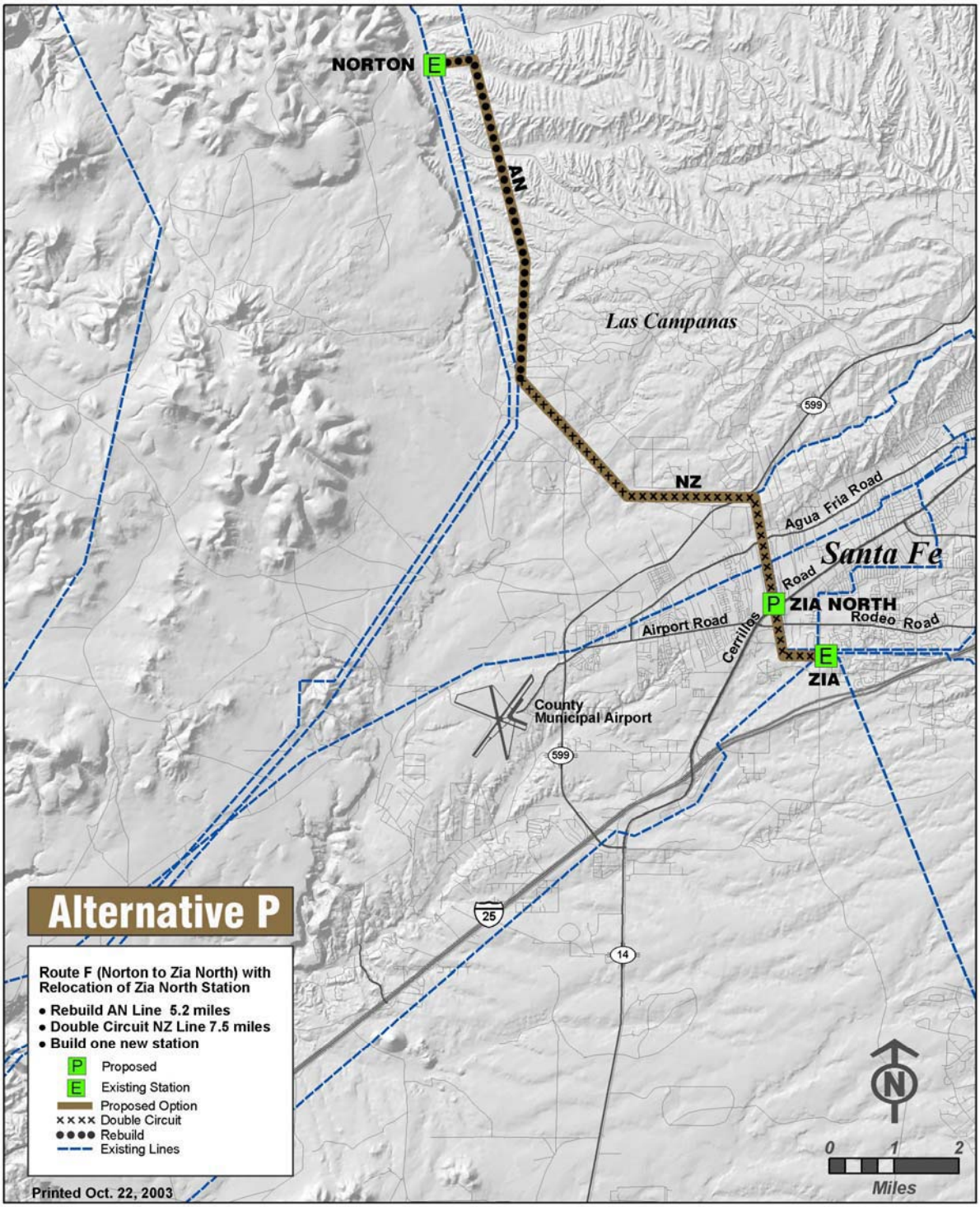

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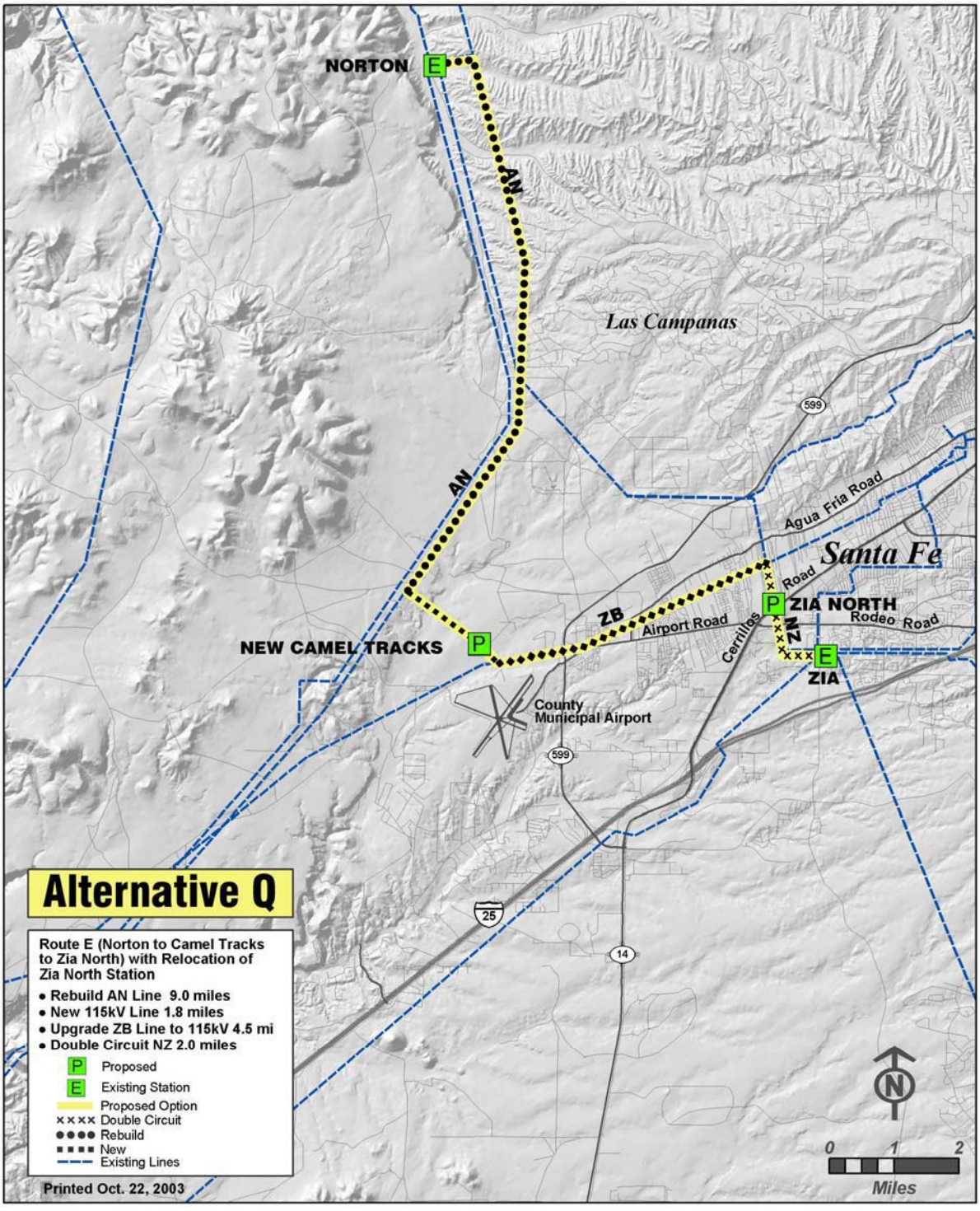

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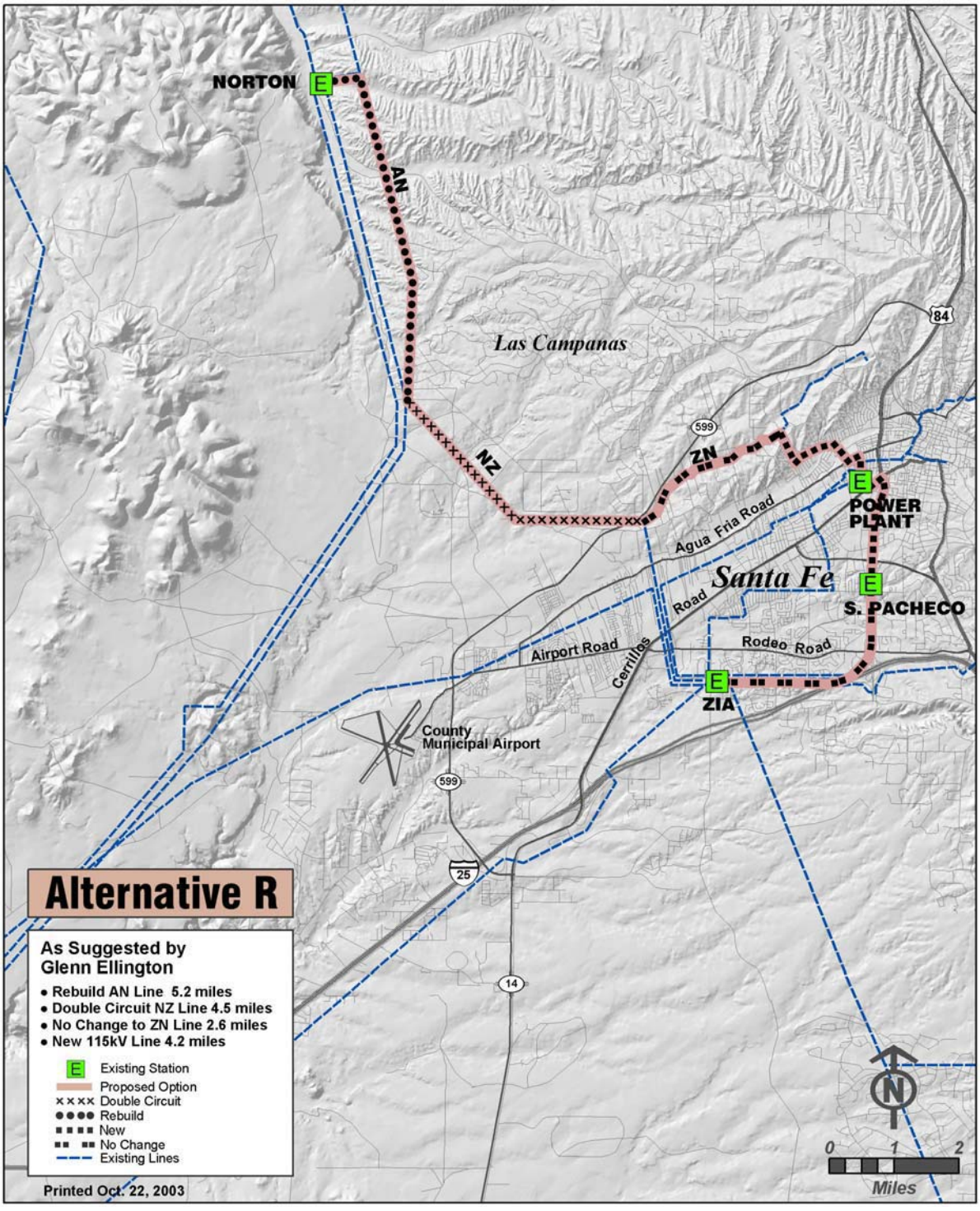


PROJECT POWER

Transmission Line Alternatives
Studied and Eliminated from Further Consideration

2.3 Alternatives Analyzed in Detail

Based on the screening results, four action alternatives and the No Action alternative are described and their impacts are analyzed in this EA. The action alternatives include:

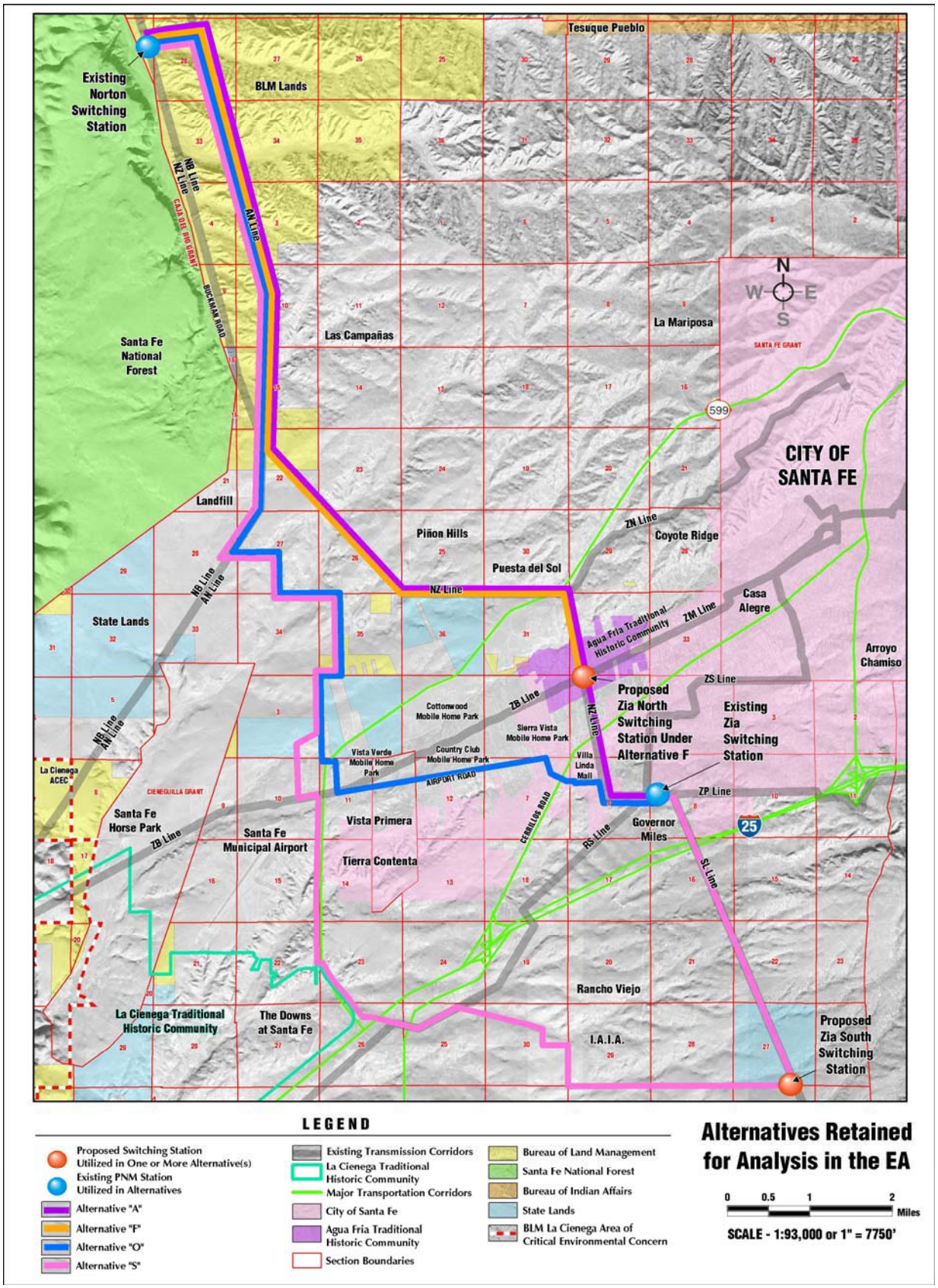
- **Alternative A:** Norton to Zia
- **Alternative F:** Norton to Zia North
- **Alternative O:** Norton to Zia via Airport Road
- **Alternative S:** Norton to New Zia South to Zia

Their locations are shown in Map 2-1 on the following page. Descriptions of the alternatives follow, starting with No Action. Figure 2-3 through Figure 2-6 contain maps, diagrams, photos, and detailed descriptions of each alternative.

The alternatives are described in terms of the portions of transmission line that occur on BLM land and non-BLM land, to facilitate separate consideration and decisions. This distinction carries through to Chapter 3, where the affected environment and environmental consequences also are broken out as to those that occur on BLM land and those that occur on non-BLM land.

Appendix A, Transmission Line Access and Structure Maps, contains maps displaying the alternatives' structure sites, access roads, switching stations, and pulling sites.

Map 2-1. Alternatives Retained for Analysis in the EA



2.3.1 No Action Alternative

The No Action alternative is required to be studied in the EA by the Council on Environmental Quality for the implementation of NEPA (40 CFR 1502.14d). Under the No Action alternative, transmission lines in the Santa Fe area would be maintained in their present locations. No existing transmission lines would be rebuilt, no retrofit to existing switching stations would occur, and no new line segments or new switching stations would be built. The existing load capacity of the system is 180MW. Because the forecasted demand will require 4MW of additional power per year over the next 10 years, this alternative does not address the purpose and need of the project.

2.3.2 Alternative A: Norton to Zia

Alternative A, Norton to Zia, utilizes currently existing facilities. This alternative contains the following features:

- **Rebuilt H-Frame:** From Norton Switching Station south, 5.2 miles of the current Algodones-to-Norton (AN) H-frame-structure transmission line would be rebuilt to carry added capacity. This would include raising the crossarm, reframing the structure (raising the overall aboveground height of the structures 6 to 12 feet), and reconductoring (replacing the existing wires with new wire). Some structures may be added on long spans and structures not suitable for rebuilding may be replaced or receive other improvements such as new insulation.
- **Double-Circuit Line:** 7.9 miles along the existing Norton-to-Zia (NZ) line (adjacent to the Puesta Del Sol and Piñon Hills neighborhoods, through the Tres Arroyos Planning Area and Agua Fria) into the Zia Switching Station would be rebuilt to carry a second circuit. This would involve replacing the existing H-frame structures with tubular steel double-circuit structures.
- **Station Retrofit:** Improvements would be required within the Norton Switching Station yard, including installing a new breaker, new bus work and switches, and a new terminal structure. The existing Zia Switching Station would be retrofitted to accommodate a new 115kV line terminal. See section 2.4.4 for details.

Total length: 13.1 miles
Electric transfer capacity added: 48MW

2.3.2.1 Facilities on BLM Land: Preliminary Specifications

On BLM lands, **approximately 36 AN structures would be upgraded and 1 new H-frame structure would be built;** and **4 NZ structures would become double-circuit steel poles.** Construction would utilize non-specular conductor (non-glare wires) on all BLM land, about 6.2 miles. The existing **right-of-way of 40 feet would be widened to 75 feet** on the AN line. No new right-of-way is required for the NZ line. Temporary work areas would be required for **7 pulling sites** outside the right-of-way. **Existing access** would be used for construction. In addition, improvements would be required inside the Norton Switching Station yard. Access to facilities would generally be from Buckman Road and Caja del Rio Road.

2.3.2.2 Facilities on Non-BLM Land: Preliminary Specifications

On non-BLM lands, about 60 NZ structures would be replaced with double-circuit steel poles. Typical spacing is 800 to 900 feet. Non-specular conductor (non-glare wires) would be used. Line length on non-BLM land is 6.9 miles. No new right-of-way would

be required. Temporary work areas would be required for 7 pulling sites outside the right-of-way. Existing access would be used for construction. The existing Zia Switching Station would be retrofitted to accommodate a new 115kV line terminal.

Figure 2-3 contains a map, transmission structure diagrams, photo simulations, and detailed specifications of Alternative A.

2.3.3 Alternative F: Norton to Zia North (Initial Proposed Action)

This alternative consists of the following features:

- **Rebuilt H-Frame:** From Norton Switching Station south, 5.2 miles of the current AN H-frame transmission line would be rebuilt to carry added capacity, including raising the crossarm, reframing the structure, and reconductoring.
- **Double-Circuit Line:** 5.8 miles along the existing NZ line (adjacent to the Puesta Del Sol and Piñon Hills neighborhoods, through the Tres Arroyos Planning Area and Agua Fria) would be rebuilt to double-circuit, replacing the existing H-frame structures with tubular steel poles.
- **New Station Construction:** A new 115kV Zia North Switching Station would be constructed at the intersection of the NZ line and the Zia-to-Bernalillo (ZB) line in the Agua Fria Traditional Historic Community.
- **Station Retrofit:** Improvements would be required within the Norton Switching Station yard, including installing a new breaker, new bus work and switches, and a new terminal structure. See section 2.4.4 for details.

Total length: 11.0 miles
Electric transfer capacity added: 54MW

2.3.3.1 Facilities on BLM Land: Preliminary Specifications

See Alternative A description above.

2.3.3.2 Facilities on Non-BLM Land: Preliminary Specifications

On non-BLM lands, about 45 NZ structures would be replaced with double-circuit steel poles. Typical spacing is 800 to 900 feet. Construction would utilize non-specular conductor (non-glare wires) for 4.83 miles. No new right-of-way would be required. Temporary work areas would be required for 5 pulling sites outside the right-of-way. Existing access would be used for construction. A new Zia North Switching Station would be constructed.

Figure 2-4 contains a map, transmission structure diagrams, photo simulations, and detailed specifications of Alternative F.

2.3.4 Alternative O: Norton to Zia via Airport Road

Alternative O was suggested by the public and refined by PNM. The alternative requires:

- **Rebuilt H-Frame:** From Norton Switching Station south, 7.7 miles of the current AN H-frame transmission line would be rebuilt to carry added capacity, including raising the crossarm, reframing the structure, and reconductoring.
- **New Line Construction:** A new 7.9-mile transmission line segment would be built, running from the south end of the rebuilt AN segment, down to Airport Road and into the Zia Switching Station. This new line segment includes:

  - A 4.6-mile segment, on single-circuit wood or steel poles, from the rebuilt AN segment to Airport Road
  - A 2.5-mile segment, on single-circuit steel poles with distribution underbuild, along Airport Road
  - A 0.8-mile segment, on single-circuit wood or steel poles, connecting the Airport Road segment with a double-circuit line going into the Zia Switching Station

- **Double-Circuit Line:** A 0.8-mile portion of the H-frame NZ line from the end of the new segment into the existing Zia Switching Station would be rebuilt to double-circuit, replacing the existing H-frame structures with tubular steel poles.
- **Station Retrofit:** Improvements would be required within the Norton Switching Station yard, including installing a new breaker, new bus work and switches, and a new terminal structure. The existing Zia Switching Station would be retrofitted to accommodate a new 115kV line terminal. See section 2.4.4 for details.

Total length: 16.4 miles
Electric transfer capacity added: 47MW

2.3.4.1 Facilities on BLM Land: Preliminary Specifications

On BLM lands, **about 40 existing AN structures would be upgraded and 7 new structures would be built,** utilizing non-specular conductor (non-glare wires), for 6.7 miles. The existing **right-of-way of 40 feet would be widened to 75 feet** on the AN line. Temporary work areas would be required for **7 pulling sites** outside the right-of-way. **Existing access** would be used for construction. In addition, improvements would be required inside the Norton Switching Station yard. Access to facilities would generally be from Buckman Road and Caja del Rio Road.

2.3.4.2 Facilities on Non-BLM Land: Preliminary Specifications

On non-BLM land, 8 AN structures would be upgraded and about 60 new single-pole structures would be built. New 50-foot right-of-way is needed for the 4.6 miles on new line construction. About 15 feet of new right-of-way may be needed adjacent to Airport Road on the 2.5-mile segment. New structures, steel or wood single poles, would carry a single transmission circuit from the AN line to the existing NZ corridor. At the NZ corridor the new line and the NZ line would be placed on new double-circuit steel pole structures. The 12.5kV distribution line along Airport Road would be replaced with single-circuit steel poles carrying a 115kV conductor, with a distribution underbuild for the 12.5kV conductor. Four or five H-frame structures on a segment of the NZ line into the Zia Switching Station would be replaced with double-circuit steel poles. All lines would utilize non-specular conductor (non-glare wires). Length of new access required for Alternative O would be 4.8 miles. Temporary work areas would be required for 17 pulling sites outside the right-of-way. The existing Zia Switching Station would be retrofitted to accommodate a new 115kV line terminal.

Figure 2-5 contains a map, transmission structure diagrams, photo simulations, and detailed specifications of Alternative O.

2.3.5 Alternative S: Norton to New Zia South to Zia

Alternative S is essentially the same as a route that was suggested by the Agua Fria Community in coordination with the Santa Fe County Land Use Department, and refined by PNM. The alternative requires:

- **Rebuilt H-Frame:** From Norton Switching Station south, 7.7 miles of the current AN H-frame transmission line would be rebuilt to carry added capacity, including raising the crossarm, reframing the structure, and reconductoring.
- **New Line Construction:** A new 13.6-mile segment of line would be built, using single-circuit wood or steel poles, from the end of the rebuilt AN section, southeast to Highway 599, then south of I-25 and east to connect with the existing Santa Fe-to-Las Vegas (SL) line.
- **New Station Construction:** A new switching station, Zia South, would be built east of Rancho Viejo at the intersection of the new line and the existing SL line.
- **Rebuilt H-Frame:** 3.8 miles of the SL line would be rebuilt from the new Zia South Switching Station north to the Zia Switching Station. This work includes reframing, raising the crossarm, reconductoring, and possible replacement of some structures with small diameter poles.
- **Station Retrofit:** Improvements would be required within the Norton Switching Station yard, including installing a new breaker, new bus work and switches, and a new terminal structure. The existing Zia Switching Station would be retrofitted to accommodate a new 115kV line terminal. See section 2.4.4 for details.

Total length: 25.1 miles
Electric transfer capacity added: 47MW

2.3.5.1 Facilities on BLM Land: Preliminary Specifications

See Alternative O description above.

2.3.5.2 Facilities on Non-BLM Land: Preliminary Specifications

On non-BLM lands, 8 AN structures would be upgraded, 104 new single-pole structures would be built, and 24 SL structures would be upgraded. No new right-of-way would be required. All lines would utilize non-specular conductor (non-glare wires). Length of new access required for Alternative S would be 13.2 miles. Temporary work areas would be required for 33 pulling sites outside the right-of-way. A new Zia South Switching Station would be built east of Rancho Viejo on the SL line. The existing Zia Switching Station would be retrofitted to accommodate a new 115kV line terminal.

Figure 2-6 contains a map, transmission structure diagrams, photo simulations, and detailed specifications of Alternative S.

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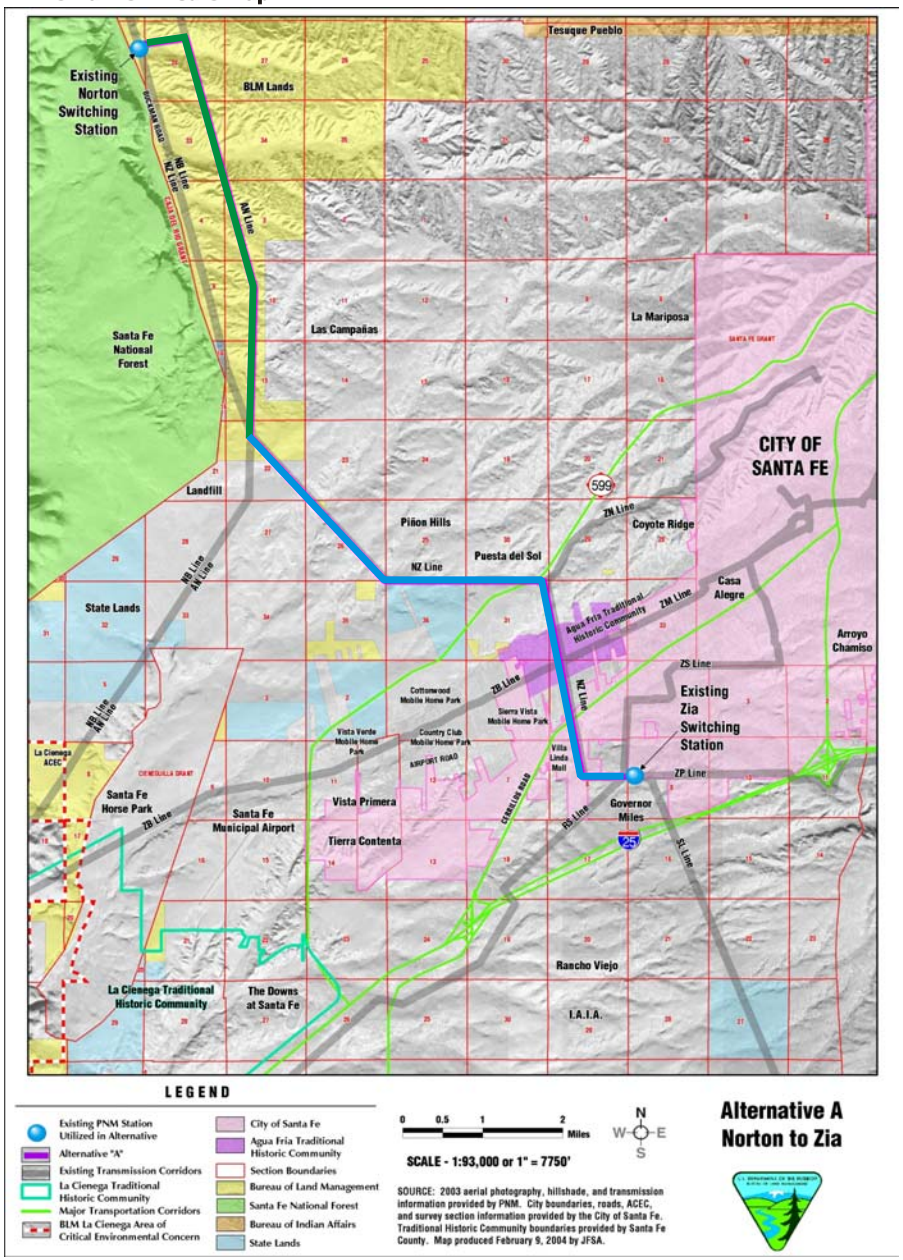
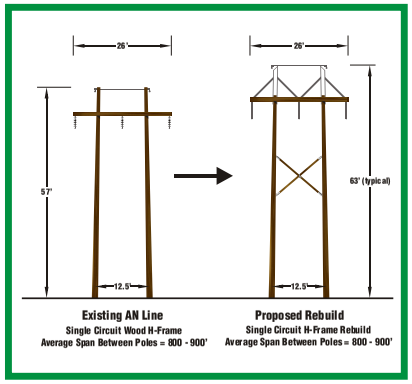
Alternative A Route Map

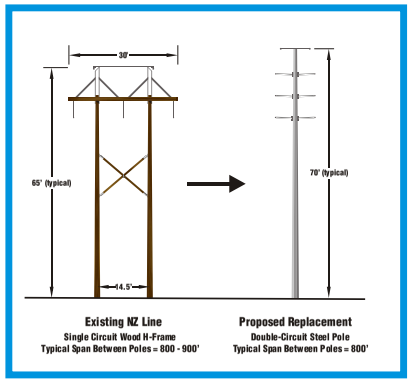


Structure Types

Rebuilt H-Frame



Double-Circuit Steel Pole



Preliminary Specifications of Alternative A

Total Alternative Length: 13.1 miles

BLM Lands

Number of structures: 40 (36 AN rebuild, 1 AN new, 3 NZ double-circuit)

Structure spacing: averages 800 - 900 feet

Conductor: Non-specular

Existing right-of-way width: 40 feet

Right-of-way width required: 75 feet

Pulling sites: 7

Length of new access required: 0

Length of improved access required: 4,088 feet

Non-BLM Lands

Number of structures: 62 (all NZ double-circuit)

Structure spacing: 800 -900 feet

Conductor: Non-specular

Existing right-of-way width: 100 feet

Right-of-way width required: 100 feet

Pulling sites: 7

Length of new access required: 0

Length of improved access required: 548 feet

Figure 2-3. Alternative A Preliminary Specifications

Alternative A Photo Simulations

(From AN portion rebuilt on all alternatives)

← Existing →

(From NZ portion double-circuited on Alternative A and Alternative F)

← Proposed →

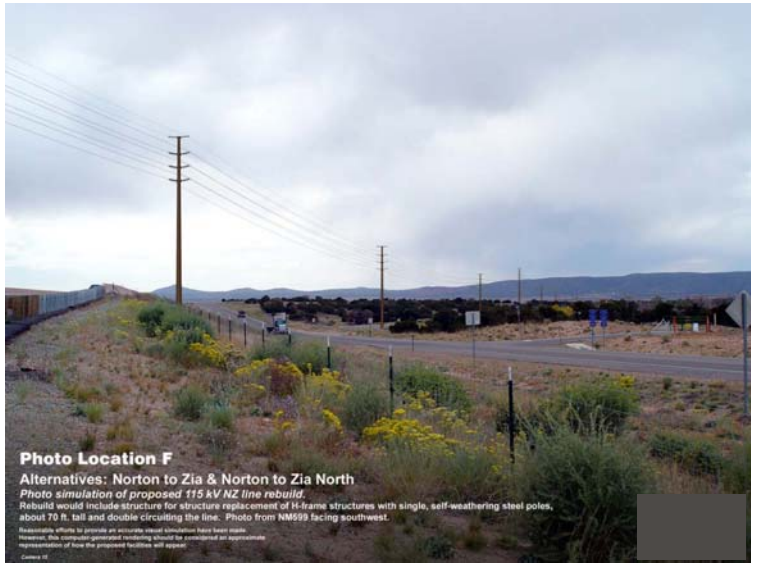
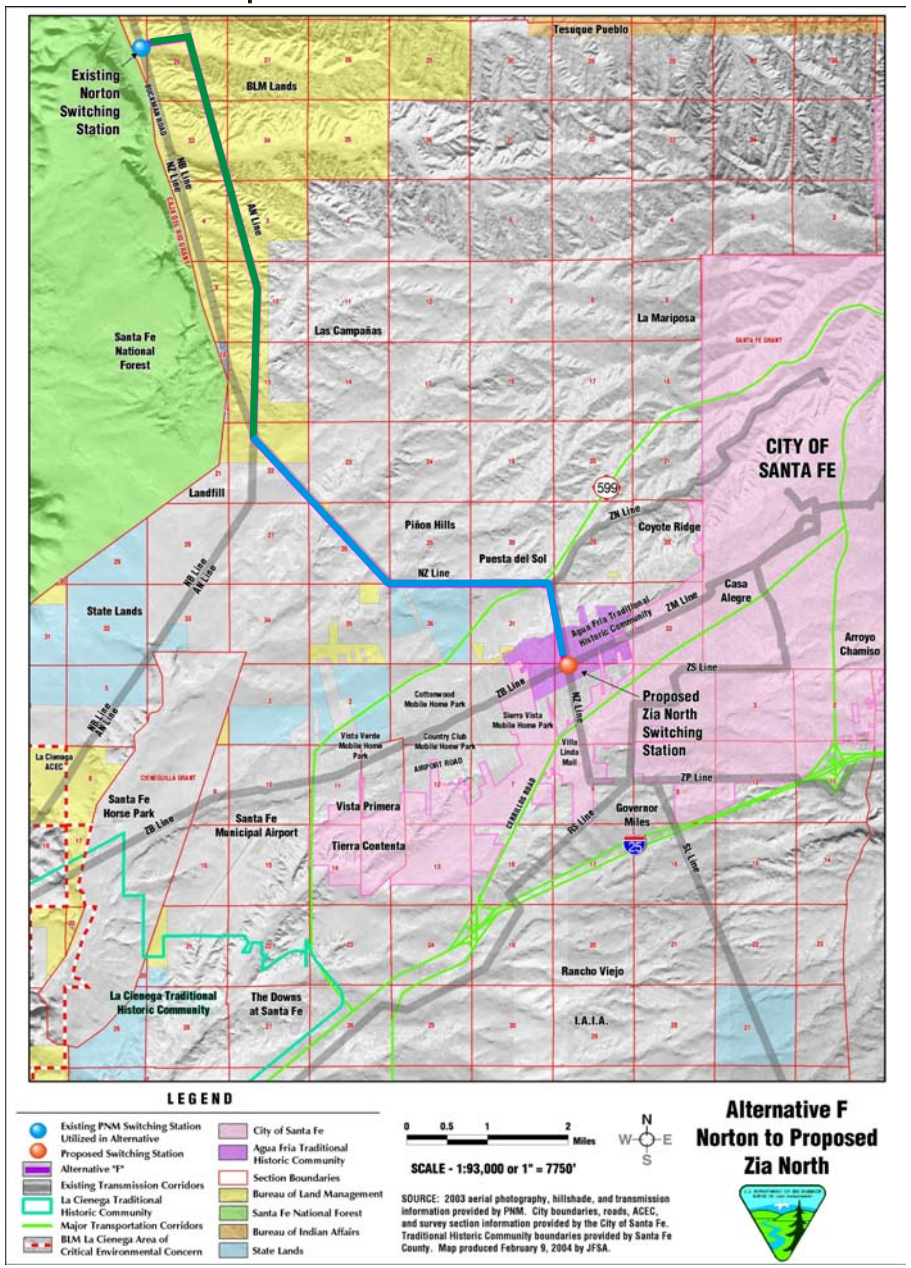


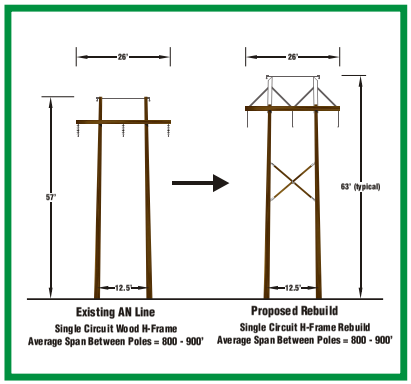
Figure 2-3a. Alternative A Specifications (Photo Simulations)

Alternative F Route Map

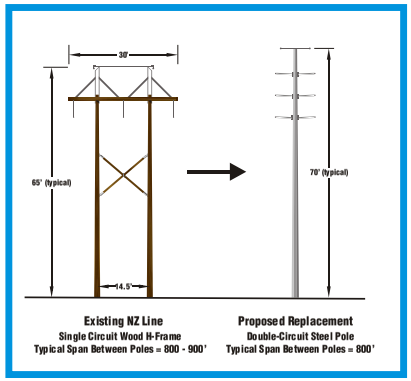


Structure Types

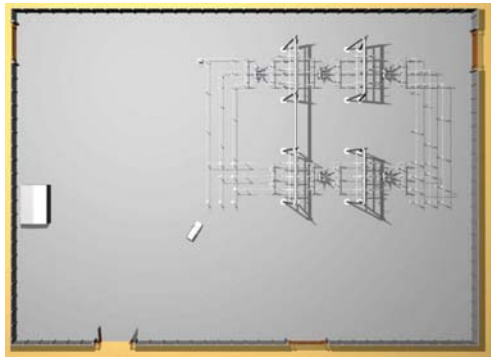
Rebuilt H-Frame



Double-Circuit Steel Pole



Switching Station - 260 x 360 feet



Preliminary Specifications of Alternative F

Total Alternative Length: 11.0 miles

BLM Lands

Number of structures: 40 (36 AN rebuild, 1 AN new, 3 NZ double-circuit)

Structure spacing: averages 800 - 900 feet

Conductor: Non-specular

Existing right-of-way width: 40 feet average

Right-of-way width required: 75 feet average

Pulling sites: 7

Length of new access required: 0

Length of improved access required: 4,088 feet

Non-BLM Lands

Number of structures: 47 (all NZ double-circuit)

Structure spacing: 800 - 900 feet

Conductor: Non-specular

Existing right-of-way width: 100 feet

Right-of-way width required: 100 feet

Pulling sites: 5

Length of new access required: 0

Length of improved access required: 548 feet

Figure 2-4. Alternative F Preliminary Specifications

Alternative F Photo Simulations

(From AN portion rebuilt on all alternatives)

← Existing →

(From NZ portion double-circuited on Alternative A and Alternative F)

← Proposed →

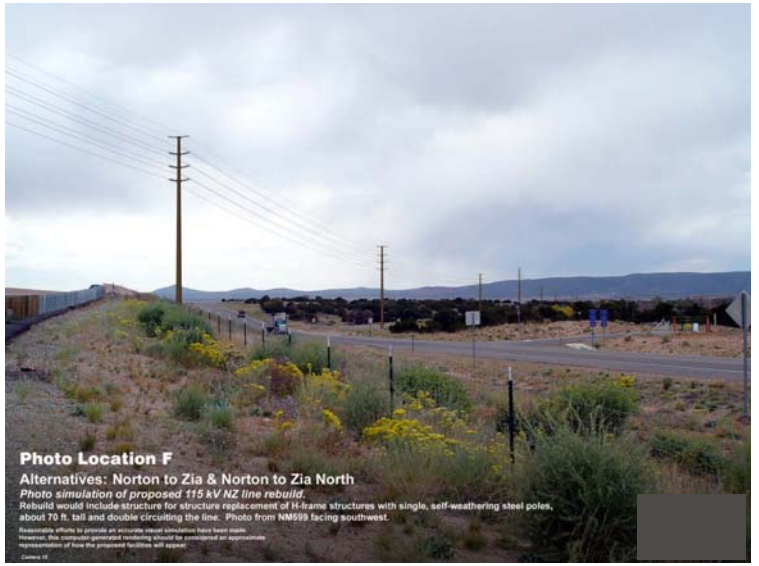
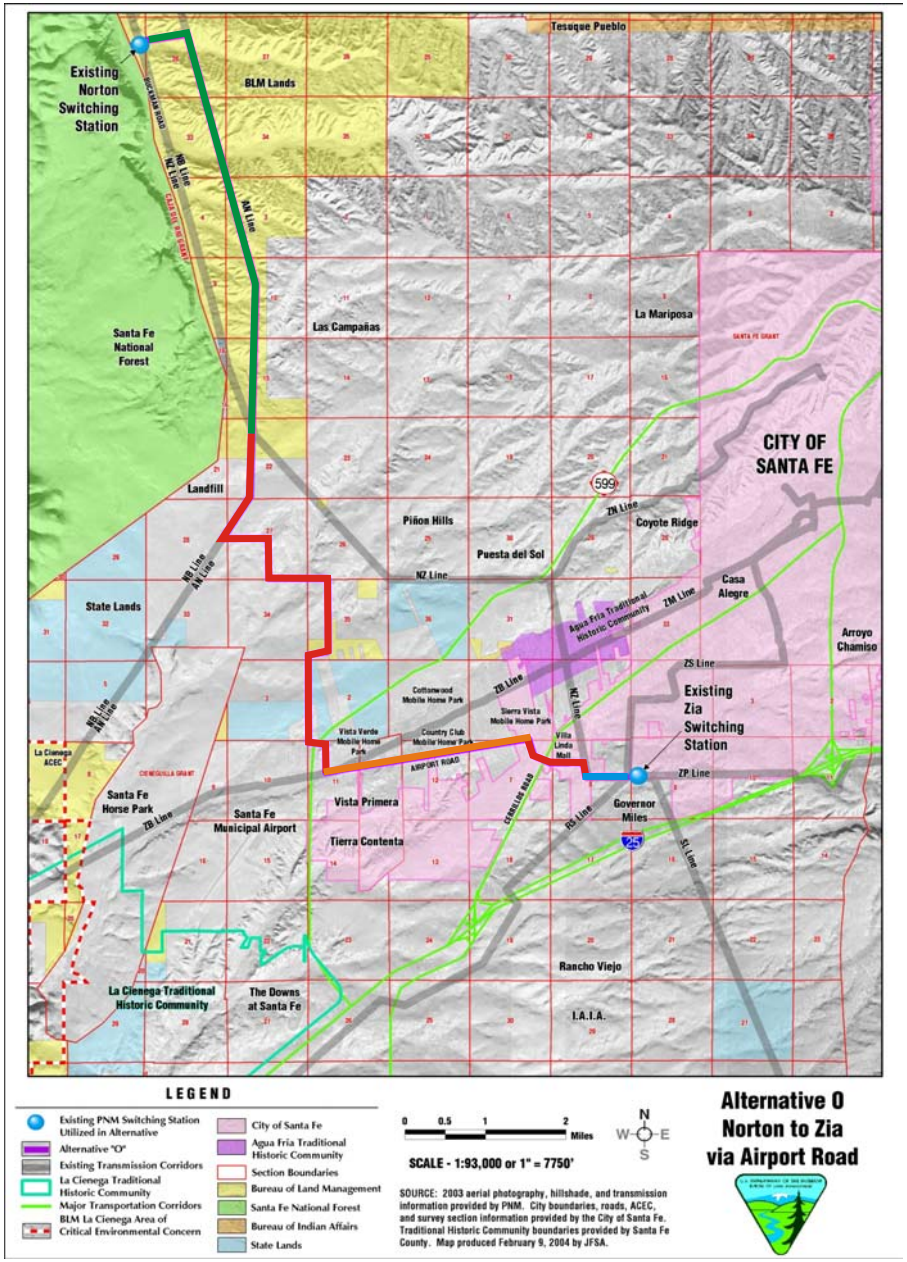


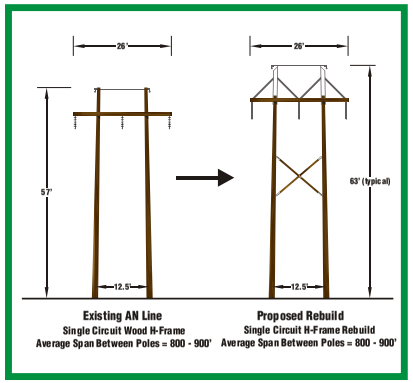
Figure 2-4a. Alternative F Specifications (Photo Simulations)

Alternative 0 Route Map

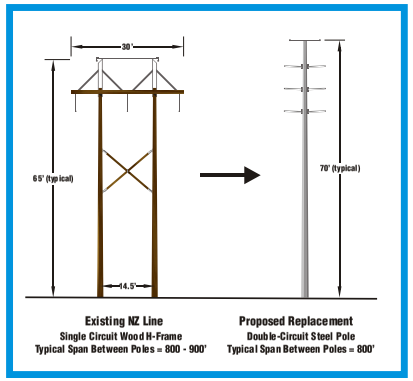


Structure Types

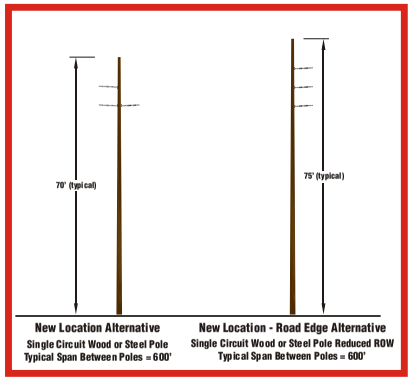
Rebuilt H-Frame



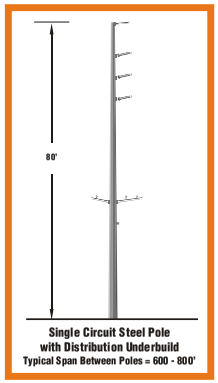
Double-Circuit Steel Pole



New Line Segment Wood or Steel Pole



New Line Segment Steel Pole



Preliminary Specifications of Alternative 0

Total Alternative Length: 16.4 miles

BLM Lands

Number of structures: 45 (38 AN rebuild, 7 new)

Structure spacing: averages 800 - 900 feet

Conductor: Non-specular

Existing right-of-way width: 40 feet average

Right-of-way width required: 75 feet average

Pulling sites: 7

Length of new access required: 0

Length of improved access required: 4,088 feet

Non-BLM Lands

Number of structures: 69 (57 new, 8 AN rebuild, 4 NZ double-circuit)

Structure spacing: 600 - 800 feet

Conductor: Non-specular

Existing right-of-way width: in road/distribution right-of-way at Airport Rd.

Right-of-way width required: 50 feet for new line; line in road/distribution right-of-way along Airport Rd. will require up to 15 feet of right-of-way adjacent to road

Pulling sites: 17

Length of new access required: 25,408 feet (4.8 miles)

Figure 2-5. Alternative 0 Preliminary Specifications

Alternative O Photo Simulations

(From new line portion)

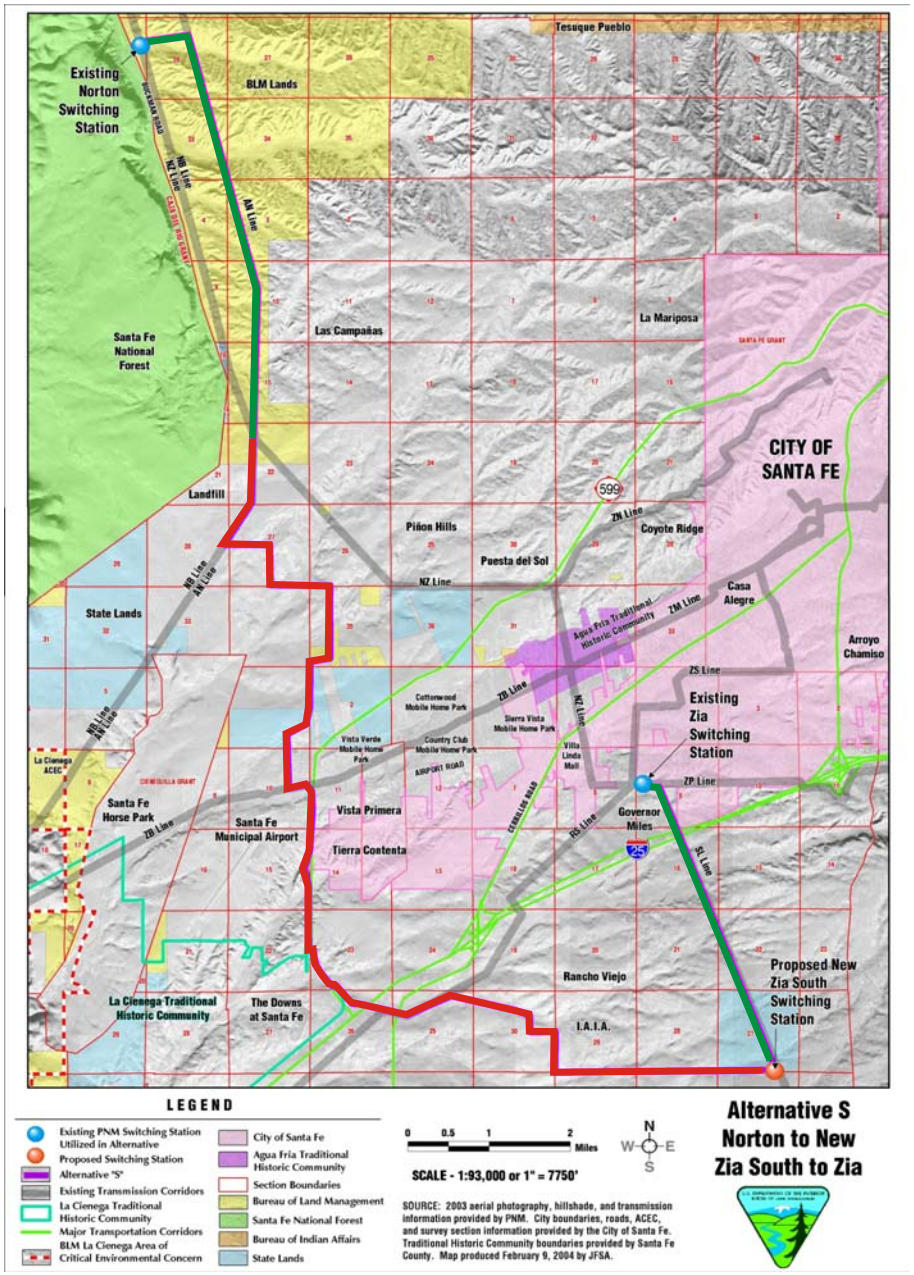
← Existing →

(From new line portion)

← Proposed →

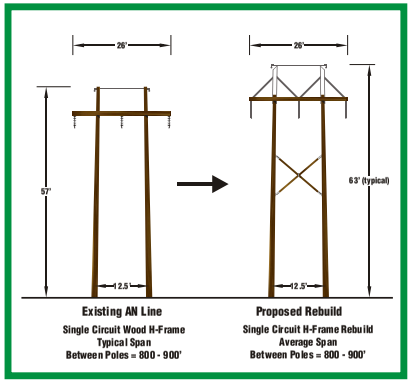
Figure 2-5a. Alternative O Specifications (Photo Simulations)

Alternative S Route Map

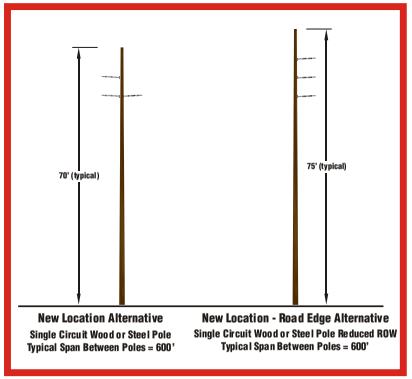


Structure Types

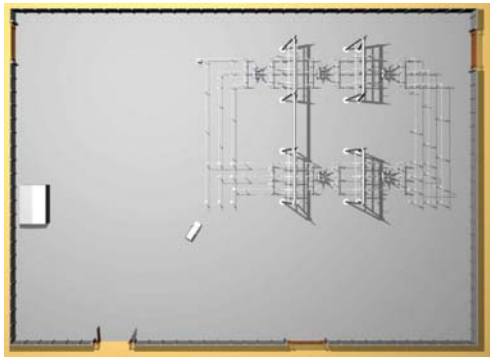
Rebuilt H-Frame



New Line Segment Wood or Steel Pole



Switching Station - 260 x 360 feet



Preliminary Specifications of Alternative S

Total Alternative Length: 25.1 miles

BLM Lands

- **Number of structures:** 45 (38 AN rebuild, 7 new)
- **Structure spacing:** averages 800 - 900 feet
- **Conductor:** Non-specular
- **Existing right-of-way width:** 40 feet average
- **Right-of-way width required:** 75 feet average
- **Pulling sites:** 7
- **Length of new access required:** 0
- **Length of improved access required:** 4,088 feet

Non-BLM Lands

- **Number of structures:** 136 (104 new, 8 AN rebuild, 24 SL rebuild)
- **Structure spacing:** 600 - 800 feet
- **Conductor:** Non-specular
- **Existing right-of-way width:** 50 feet for SL line
- **Right-of-way width required:** 50 feet for new line, no change to right-of-way width for SL
- **Pulling sites:** 33
- **Length of new access required:** 69,446 feet (13.2 miles)

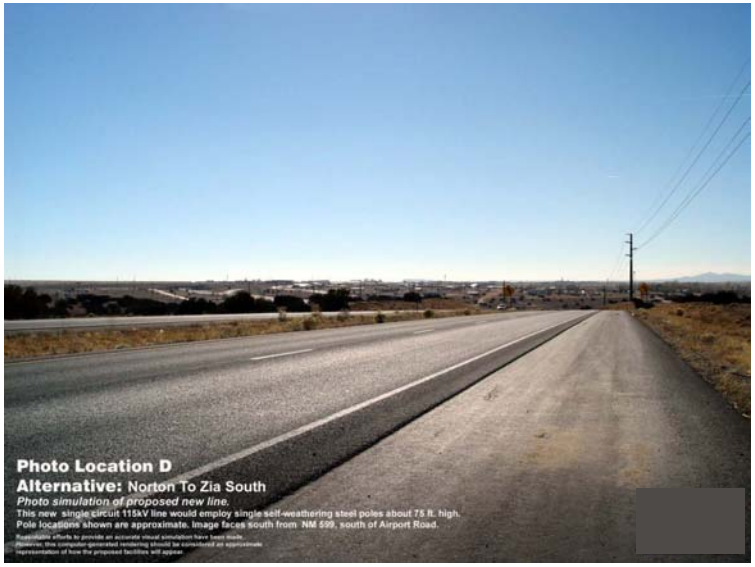
Figure 2-6. Alternative S Preliminary Specifications

Alternative S Photo Simulations

(From new line portion)

← Existing →

(From new line portion)



← Proposed →

Figure 2-6a. Alternative S Specifications (Photo Simulations)

2.4 Description of Transmission Line Facilities

The design, construction, operation, and maintenance of the new or rebuilt 115kV transmission facilities would meet or exceed the requirements of the National Electric Safety Code (NESC), U.S. Department of Labor, Occupational Safety and Health Standards, state requirements, and general utility practice. Below is a list of each type of facility required for the transmission options.

2.4.1 New Transmission Lines

New transmission lines are those built in a new transmission corridor. New line construction applies to project alternatives O and S.

2.4.1.1 Structures

Structures for the proposed new 115kV transmission lines would be either single-circuit wood poles or tubular steel poles. It is anticipated that steel poles would have a weathering steel (brown) finish. Typical structure-to-structure spans are anticipated to be 600 to 800 feet. Typical structure heights would average 70 feet to 80 feet above ground. Tangent structures would be either steel or wood poles. Angle and dead-end structures would be self-supporting (unguyed) steel poles.

2.4.1.2 Foundations

It is anticipated that the 115kV tangent transmission structures would be directly placed into augered holes and held in place with tamped and compacted natural or select backfill material. Angle and dead-end structures must carry higher structural loads and would require drilled pier foundations. Shafts are augered and reinforced concrete is placed into the shaft with anchor bolts. The pole is then bolted to the top of the concrete pier.

2.4.1.3 Conductors

The conductor, or wire, for the 115kV lines would consist of three phases, with a single conductor for each phase. Each conductor would be aluminum stranded with a steel stranded reinforced core (ACSR). Conductor diameter is a little over 1 inch. PNM proposes to use a non-specular conductor that is pre-dulled to be less reflective and noticeable.

Conductor heights (clearances) above ground and other objects would meet National Electric Safety Code (NESC) requirements. The exact height of each structure would be governed by topography and sized to meet NESC requirements for conductor clearance.

2.4.1.4 Insulators and Associated Hardware

The 115kV line would be insulated with polymer type insulators and utilize standard utility hardware.

2.4.1.5 Overhead Shield Wires

To protect the 115kV transmission line from direct lightning strike, one continuous overhead shield wire would be installed on the top of the structures. Current from lightning strikes would be transferred through the shield wire and structures into the ground. The shield wire would also carry fiber optic strands used for communications. Shield wire diameter is about ½ inch.

2.4.1.6 Access Road Construction

Vehicular access would need to be developed to every structure site. Width of access roads needed is expected to be 12 feet. Where possible, existing roads would be used.

On BLM lands, 4-wheel-drive access currently exists to all structures. For larger vehicles, there would be a need for some regrading of the existing road bed to structure sites. A right-of-way grant would authorize maintenance along the existing access road.

2.4.2 Rebuilt (H-Frame) Transmission Lines

The rebuilt facilities utilize existing structures to carry added capacity. For existing 115kV H-frame lines, this would likely include raising the crossarm, reframing the structure, and reconductoring (replacing the existing phase conductors with new wire). An overall increase in aboveground height of 6 to 12 feet is anticipated. A few additional structures would be needed and a few of the existing structures may need to be replaced, depending on their condition. H-frame rebuilds occur within all of the project alternatives.

2.4.2.1 Structures

Structures for the existing upgraded 115kV transmission line are a wood-pole H-frame design. The crossarm would be raised and the structure would be reframed. An overall increase in aboveground height of 6 to 12 feet is anticipated. Typical structure-to-structure spans average 800 to 900 feet. Where an upgrade is not feasible, existing structures may be replaced or a structure added mid-span.

Figure 2-7. H-Frame Structure: Raising Crossarm and Reframing

2.4.2.2 Foundations

Existing structures are directly embedded into the ground. Any new or replaced transmission structures would be directly placed into augered holes and held in place with tamped and compacted natural or select backfill material. Angle and dead-end structures are guyed.

2.4.2.3 Conductors

The replaced conductor for the 115kV line would consist of three phases, with a single conductor for each phase. Each conductor would be aluminum stranded with a steel stranded reinforced core (ACSR). The new conductor would be a little over 1 inch in diameter (existing conductor is about ¾ inch in diameter). PNM proposes to use a non-specular conductor (non-glare wires).

Conductor heights (clearances) above ground and other objects would meet National Electric Safety Code (NESC) requirements. The exact height of each structure would be governed by topography and sized to meet NESC requirements for conductor clearance.

2.4.2.4 Insulators and Associated Hardware

The 115kV line would be insulated with polymer type insulators and utilize standard utility hardware.

2.4.2.5 Overhead Shield Wires

Overhead shield wires are needed to protect the conductor from lighting strikes. Upgraded lines would be reconductored with a fiber optic overhead ground wire of similar or slightly larger diameter. The 115kV H-frame lines have two continuous overhead shield wires, approximately ½ inch in diameter. Current from lightning strikes would be transferred through the shield wire and structures into the ground. Fiber is used to carry communications signals.

2.4.2.6 Access Road Construction

Vehicular access would need to be provided to every structure site. Access along existing transmission corridors is usually established and in place. These roads are currently used for line patrol. However, these older roads may need to be regraded or have drainage control added at select locations in order to accommodate construction vehicles. Width of access roads needed is expected to be 12 feet. A right-of-way grant would authorize maintenance along the existing patrol trail.

2.4.2.7 Outages

It is anticipated that extended outages would be secured on the facilities to be upgraded and that minimal temporary facilities would be required.

2.4.3 Double-Circuit Transmission Lines

Transmission lines would be rebuilt to double-circuit in existing transmission corridors that need to accommodate two circuits. The existing facility in the line corridor is removed and a new facility is rebuilt on the existing alignment. As the existing facility must be taken out of service for this process, a temporary line may be needed to maintain service while the new facility is under construction. Structures for the proposed rebuilt 115kV transmission line would be double-circuit tubular steel pole with a brown self-weathering steel finish. Double-circuit lines apply to project alternatives A, F, and O.

2.4.3.1 Structures

Structures for the proposed double-circuit 115kV transmission line would be tubular steel poles with a weathering steel finish. Typical existing structure-to-structure spans are approximately 800 to 900 feet. Typical structure heights would average 70 to 80 feet above ground. All structures would be self-supporting (unguyed).

2.4.3.2 Foundations

It is anticipated that the 115kV tangent transmission structures would be directly placed into augered holes and held in place with tamped and compacted natural or select backfill material. Angle and dead-end structures must carry higher loads and would require drilled pier foundations. Shafts are augered and reinforced concrete is placed into the

shaft with anchor bolts. The pole is then bolted to the top of the concrete pier. Size of drilled pier foundations depends on structural loads and soil conditions.

2.4.3.3 Conductors

The conductor for the 115kV line would consist of three phases, with a single conductor for each phase. Each conductor would be aluminum stranded with a steel stranded reinforced core (ACSR). Conductor diameter is typically between 1 and 1.5 inches. PNM proposes to use a non-specular conductor (non-glare wire).

Conductor heights (clearances) above ground and other objects would meet National Electric Safety Code (NESC) requirements. The exact height of each structure would be governed by topography and sized to meet NESC requirements for conductor clearance.

2.4.3.4 Insulators and Associated Hardware

The 115kV line would be insulated with polymer type insulators and utilize standard utility hardware.

2.4.3.5 Overhead Shield Wires

To protect the 115kV transmission line from direct lightning strike, two continuous overhead shield wires would be installed on the top of the structures. Current from lightning strikes would be transferred through the shield wire and structures into the ground. The shield wire also would carry fiber optic strands used for communications. Shield wire diameter is about ½ inch.

2.4.3.6 Access Road Construction

Vehicular access would be needed for every structure site. Access along existing transmission corridors is usually established and in place. These roads are currently used for line patrol. However, these older roads may need to be regraded or have drainage control added at select locations in order to accommodate construction vehicles. A right-of-way grant would authorize maintenance along the existing patrol trail.

2.4.3.7 Temporary Line Construction

Where extended outages cannot be secured for a line rebuild, temporary line facilities may be developed. Two types of temporary facilities are anticipated: 1) A temporary wood pole line may be built near the edge of the right-of-way. 2) An existing 46kV line may be re-insulated to 115kV and operate at 115kV during construction only. At the end of construction, temporary facilities would be retired or returned to their original use.

2.4.4 Switching Stations

All alternatives require switching station construction, either a retrofit of an existing station, or construction of a new station.

2.4.4.1 Retrofit at Zia Switching Station

Alternative A and Alternative O would require retrofit of the Zia Switching Station to accommodate a new 115kV line terminal. Work includes:

- Line relocations (temporary and permanent) to free up space for new yard
- Earthwork including cut and fill, grading, drainage improvements, and possibly installation of retaining walls

- Installation of ground grids and cable trenches
- Installation of concrete foundations (drilled pier and spread/slab)
- Installation of equipment including breakers, switches, and outside control equipment
- Installation of ring bus, insulators, and line termination structures (structures would be dulled galvanized steel)
- Installation of control shed (may be built on-site or come pre-fabbed)
- Installation of communications, control, and protection equipment in the control shed

Access to this site is developed. Work would occur on PNM property or easements.

2.4.4.2 Retrofit at Norton Switching Station

All alternatives require improvements at Norton Switching Station. Improvements would occur within the Norton Switching Station yard, including installing a new breaker, new bus work and switches, and a new terminal structure. Work would include:

- Installation of concrete foundations (drilled pier and spread/slab)
- Installation of outdoor equipment, switches, and outside control equipment
- Installation of bus, insulators, and line termination structures (structures would be dulled galvanized steel)
- Installation of communications, control, and protection equipment in the control shed

2.4.4.3 New Switching Station

Alternative F requires construction of a new Zia North Switching Station. Alternative S requires construction of a new Zia South Switching Station. The land area needed for a new switching station is approximately 260 feet by 360 feet (approximately 2.4 acres).

PNM typically purchases property for new stations. The transmission line termination structures for the switching station are tubular steel structures. Finish may be weathering steel (brown) or a dulled galvanized coating (grey). The electrical equipment yard would be open and include power circuit breakers, disconnect switches, lightning/surge arrestors, and bus (conductor) support structures. Bus support structures would have a dulled galvanized finish. Other structures would include a control shed. At the proposed Zia North Switching Station, a 115/46kV step-down transformer would be needed as well as a 46kV bus and breakers to support Santa Fe loads.

The station yard is typically enclosed with either a chain link fence or block wall. Access roadways would be developed to and within the yard.

The site preparation work at the proposed switching stations would involve cut and fill grading and placement and compaction of structural fill to serve as foundation for the switching facilities. The site would be graded to meet local standards for drainage control and to protect PNM equipment.

2.5 Assumptions for Action Alternatives

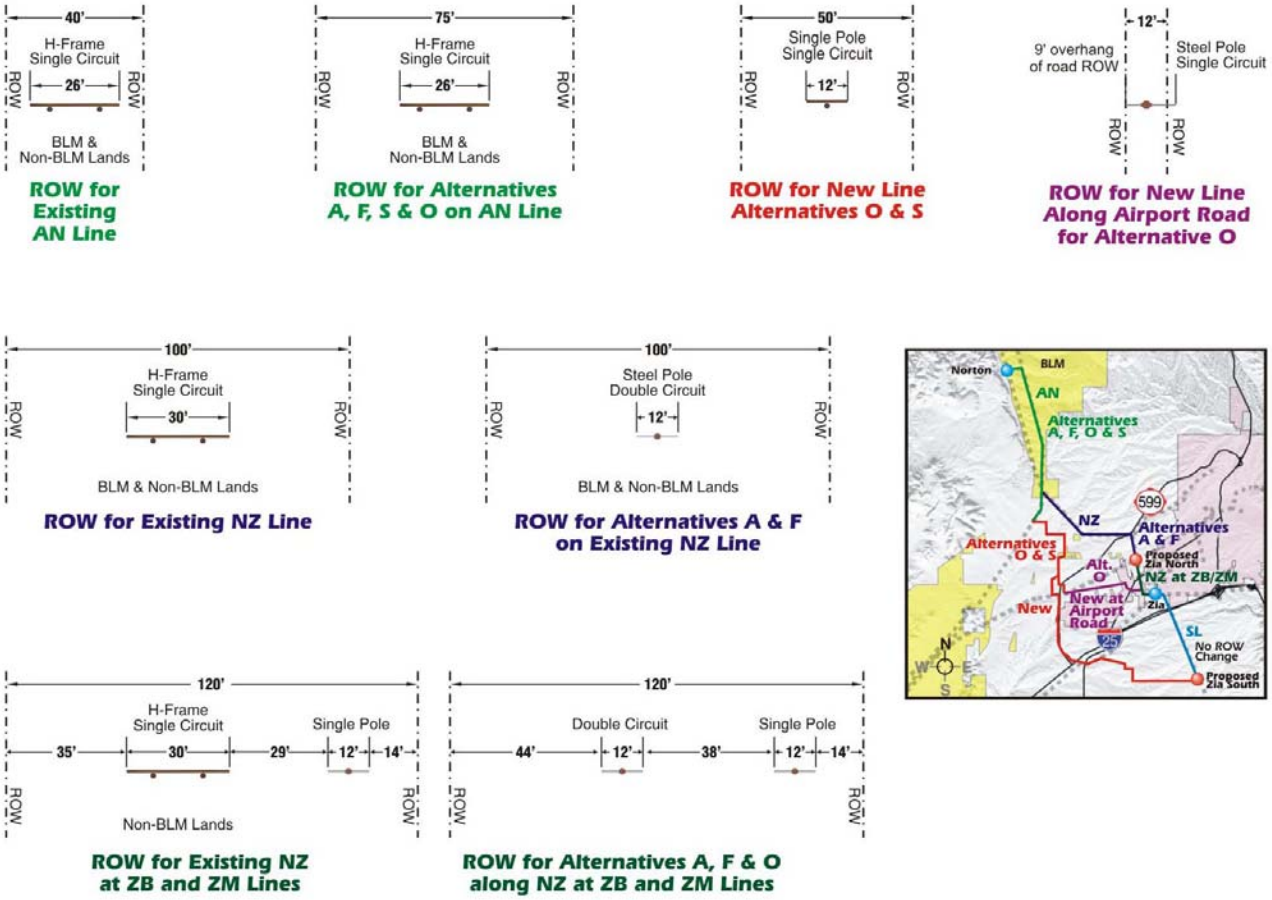
2.5.1 Right-of-Way

Right-of-way requirements vary by alternative. Table 2-2 documents the existing right-of-way along alternatives A, F, O, and S on BLM lands and non-BLM lands, and also indicates right-of-way requirements for each alternative. PNM typically obtains easements on private land rather than purchasing the land outright for transmission lines, thus allowing for continued limited uses within the right-of-way. Figure 2-8 displays the alternatives' right-of-way width and configurations.

Table 2-2. Right-of-Way (ROW) Requirements

Alternative	BLM Lands		Non-BLM Lands	
	Existing ROW	Required ROW	Existing ROW	Required ROW
A	AN ROW 40 – 75'	75'	NZ ROW 100'	100' (no new ROW required)
	NZ ROW 100'	100' (no new ROW required)		
F	AN ROW 40 – 75'	75'	NZ ROW 100'	100' (no new ROW required)
	NZ ROW 100'	100' (no new ROW required)		
O	AN ROW 40 – 75'	75'	AN ROW 75'	75' (no new ROW required)
			New line – no ROW	50'
			PNM & Airport Rd. ROWs	14.5
S	AN ROW 40 – 75'	75'	AN ROW 75'	75' (no new ROW required)
			New line – no ROW	50'
			SL ROW 50'	50' (no new ROW required)

Figure 2-8. Right-of-Way Configurations and Average Widths



2.5.2 Fiber Optic Wire

While reconductoring is occurring, both existing static wires (.4-inch diameter) would be reconductored and replaced with combined static/fiber optic wires called Optical Protective Ground Wire (OPGW). PNM uses an OPGW that is ½ inch in diameter. On new lines, the static wires would be combined static/fiber optic wires. The fiber optic communication system would control, protect, and ensure the safety of the electrical system between stations and would improve the quality of communications over and above the existing system.

The OPGW has been designed in cooperation with vendors to match the engineering sag and tension criteria of the existing steel shield wire so that it could be used as a direct replacement. No innerducts are planned and no warning markers would be installed.

No additional structures would be needed to install the OPGW. However, fiber splicing vaults or boxes would be either buried at the base of each splice structure or mounted to the structure approximately 15 feet above ground in protective boxes. Underground splicing vaults would be approximately 4 feet high, 1 foot wide and 2 feet deep with 2-inch conduits running from structure to ground and placed at a minimum 6 feet below grade, 48 inches in diameter and 2 feet deep with gravel placed below the vaults to facilitate drainage. They would be made of fiberglass, plastic, or steel, and would be

placed in previously disturbed areas with locking covers to allow access at the ground surface. Structure-mounted splice boxes would be placed about 15 feet above ground. The "box" is usually a steel canister, about 2 feet long and 8 to 10 inches in diameter. A coil of OPGW is mounted around the box on a steel or aluminum rack. The box is lowered to the ground when splicing takes place and this coil provides the added OPGW that is needed to lower the box. These splicing sites would be located at pulling sites.

The OPGW installation would occur within the existing right-of-way. The static/fiber optic line would be pulled by the same equipment used for reconductoring and would occur concurrently with reconductoring. With the possible exception of the underground splicing vaults, surface or subsurface disturbance would be the same as for reconductoring. Areas of sensitive resources would be flagged; monitors would be present at all environmentally sensitive areas during construction.

2.6 Construction Activities and Specifications

Prior to the development and construction of a transmission line or a station, several activities take place. Below is a summary of activities for the facilities and structures that would need to be completed for each of the alternatives reviewed. Photographs of typical equipment used in transmission line or station construction are provided in Figure 2-9.

2.6.1 Transmission Line

Construction of a transmission line generally follows this sequence:

1. Obtain permits
2. Survey the centerline
3. Perform environmental surveys
4. Develop access for construction and maintenance vehicles
5. Selectively clear right-of-way and structure sites
6. Install foundations
7. Assemble and erect the structures
8. Install conductors and overhead shield wires
9. Install grounding system
10. Complete cleanup and site reclamation
11. Perform facility operation and maintenance

The number of workers and types of equipment would vary during the construction period. Number of personnel would range up to approximately 20. Multiple crews may be working on the transmission line. Equipment anticipated would include several pickup trucks, bucket trucks, several larger (2-ton) trucks, a light crane, a 60-ton crane, an auger, reel trailers, drum pullers, conductor tensioner, bulldozer, and grader. Miscellaneous small power tools may require the use of generators and air compressors.

The rebuilt and upgraded lines generally follow the same sequence of construction, but may not require all of the above steps. (For example, the right-of-way for the existing line is established and would not require development of access to the same degree as a new line.)

Construction of any of the alternatives may need to be staged in a specific sequence in order to minimize outages and/or take advantage of low electrical load periods.

2.6.1.1 Permits Required

Permitting actions related to the project include modifications to the existing permit that would increase the BLM right-of-way width, authorize defined access on BLM land, allow fiber optic wires to be installed, and allow temporary use areas along the length of the line for movement and temporary placement of equipment and materials.

The areas outside the right-of-way include patrol trails, overland routes, access to patrol trails, and pulling sites. In areas where patrol trails are outside the right-of-way, no patrol trail, access to the patrol trail, or overland route maintenance would be conducted beyond the 12-foot width without authorization. The use areas outside the right-of-way are shown on Table 2-3 and on the map in Appendix A titled "Project Power BLM Road Use Classifications and Access outside Right-of-Way."

Table 2-3. Use Areas Outside Right-of-Way on BLM Land

Road ID	Type of Use	Length (feet) or Acres	Between Structures	Township, Range, and Section
Patrol Trails Outside Proposed ROW (shown north to south)				
12	PNM Patrol Trail (Outside ROW)	550'	AN229 - AN230	T18N; R8E; S29
11	PNM Patrol Trail (Outside ROW)	346'	AN228 - AN229	T18N; R8E; S28 and 29
10	PNM Patrol Trail (Outside ROW)	219'	AN227 - AN228	T18N; R8E; S28
9	PNM Patrol Trail (Outside ROW)	1014'	AN227 - AN228	T18N; R8E; S28
8	PNM Patrol Trail (Outside ROW)	213'	AN226 - AN227	T18N; R8E; S28
7	PNM Patrol Trail (Outside ROW)	262'	AN226 - AN227	T18N; R8E; S28
6	PNM Patrol Trail (Outside ROW)	58'	AN224 - AN226	T18N; R8E; S28
5	PNM Patrol Trail (Outside ROW)	115'	AN224 - AN226	T18N; R8E; S28
4	PNM Patrol Trail (Outside ROW)	156'	AN215 - AN216	T18N; R8E; S33
3	PNM Patrol Trail (Outside ROW)	840'	AN215 - AN216	T18N; R8E; S33
2	PNM Patrol Trail (Outside ROW)	156'	AN204 - AN205	T17N; R8E; S10
1	PNM Patrol Trail (Outside ROW)	217'	AN193 - AN194	T17N; R8E; S22
Patrol Trail Outside ROW Total:		**4,145 Feet**		

Road ID	Type of Use	Length (feet) or Acres	Between Structures	Township, Range, and Section
Overland Routes (Temporary Use Areas) (Feet)				
N/A	Overland Route	110’	AN212 – AN213	T17N; R8E; S3
N/A	Overland Route	600’	AN211 – AN212	T17N; R8E; S3 and 4
Overland Routes Total		**710 feet**		
Access to Patrol Trail (Temporary Use Areas)				
A	Access to PNM Patrol Trail	4,000’	AN222 – AN223	T18N; R8E; S28 and 29
B	Access to PNM Patrol Trail	3,740’	AN210 – AN211	T17N; R8E; S3 and 4
C	Access to PNM Patrol Trail	740’	AN213 – AN214	T18N; R8E; S34 T17N; R8E; S3
D	Access to PNM Patrol Trail	4,130’	AN207 – AN208	T17N; R8E; S3 and 4
Access to Patrol Trail Total		**12,610 feet**		
Pulling Sites (Temporary Use Areas) (Acres)				
N/A	Pulling Site	1.57 acres	AN224	S28; T18N; R08E
N/A	Pulling Site	1.96 acres	AN216	S33; T18N; R08E
N/A	Pulling Site	0.86 acres	AN 210 – AN211	S03; T17N; R08E
N/A	Pulling Site	2.53 acres	AN205	S10; T17N; R08E
N/A	Pulling Site	0.86 acres	AN229	S28 and 29; T18N; R08E
N/A	Pulling Site	1.73 acres	AN207A	S03; T17N; R08E
N/A	Pulling Site	1.13 acres	AN194	S22; T17N; R08E
N/A	Pulling Site	0.75 acres	AN194	S22; T17N; R08E
Pulling Site Total		**11.39 acres**		

2.6.1.2 Surveying Activities

Before construction of a new or rebuilt line begins, it is necessary to identify the centerline location, stake structure locations, identify right-of-way boundaries, and delineate structure access routes.

2.6.1.3 Existing Access Improvements and Access Road Construction

Transmission line construction requires the movement of large vehicles along the right-of-way. If new access roads are required, they would be constructed to support the weight of these vehicles.

Unpaved access roads would be required for the construction, operation, and maintenance of the proposed transmission line. Existing roads would be used when adequate. Where existing roads can be used, only spur roads to the structure sites would be required. On

existing corridors, patrol trails currently provide access to the pole sites. On BLM land these will be maintained in accordance with stipulations for roads set forth by the BLM's Taos Field Office. An access plan would be developed in cooperation with the BLM. Where feasible on existing corridors, the existing line patrol trails would be used and modified as required. If adverse conditions exist, such as the need to avoid sensitive resources, the access roads may need to be relocated to mitigate these issues. Prior authorization from the BLM would be required.

The patrol trail for the AN line has been maintained since it was constructed in the early 1950s, but was not separately defined on BLM land. Much of the patrol trail, including areas through drainages, has been repeatedly graded over the years, although portions of the patrol trail, especially on flat-topped terraces along the northern end of the line, are two-tracks that have never been improved. Re-establishing access would involve performing road improvements along the right-of-way patrol trail and improvements to certain existing access alignments that connect the patrol trail to established roadways. All access roads and the patrol trail would also be used for future maintenance and repair along the AN line.

Proposed road improvements would occur in eroded areas including drainages and steep slopes where grading has occurred repeatedly. They are characterized by varying levels of potential change caused by blade work, including boulder removal and potential blading to a depth ranging from less than 1 foot to 2 feet or more. The access and structure maps in Appendix A show these proposed road improvement areas characterized by three different levels of potential change caused by blade work. They are:

- **Minor blade work:** includes boulder removal, potentially blading to a depth of 1 foot or less.
- **Moderate blade work:** includes boulder removal and potentially blading to a depth between 1 and 2 feet.
- **Major blade work:** includes resurfacing and potentially blading to a depth of 2 feet or more.

Slight bladework may also occur in instances where very minimal leveling would be needed to enable equipment clearance. These **heavy equipment areas** are also identified on the maps in Appendix A, and would be located inside the proposed 75-foot right-of-way.

2.6.1.4 Temporary Facilities

The installation of temporary facilities would generally follow the same sequence as new construction. Because the facilities would not need to be maintained for the long term, minimal work would be done to develop the temporary structure sites and access. Temporary facilities would include **pulling sites** (described further in section 2.6.1.11) and **overland routes** (areas that have been used by off-road/all-terrain vehicles, which would be used for patrol trail access to avoid disruption of steep slopes).

2.6.1.5 Line Retirement

Rebuilt facilities require the retirement and removal of existing transmission facilities. On lines where the old structure and wires would be retired, conductor and overhead shield wire would be dropped to the ground, coiled up quickly to limit ground disturbance, and

removed from the site. On lines where reconductoring is occurring, the old static wire and conductor would be used to pull in the new wire. The old wires would be coiled up at the pulling site. Insulators and hardware would be removed from the structures. Wood pole structures would be dismantled. The poles and guy anchors would be cut off approximately two feet below ground line. If a new structure is going in the exact same location as a retired structure, pole butts may be completely excavated. Materials from older transmission lines generally are not reusable, except as scrap. All retired materials would be disposed of properly.

2.6.1.6 Structure Site Clearing

At each new structure site, a level working area (pad) would be needed to facilitate the safe operation of equipment, such as construction cranes. The level area required for the location and safe operation of large cranes would be approximately 30 by 40 feet. The work area would be cleared of vegetation only to the extent necessary. After line construction, all pads not needed for normal transmission line maintenance would be graded to blend as nearly as possible with the natural contours, and re-vegetated where required.

2.6.1.7 Foundation Installation

Excavations for structures would be made with power equipment. It is anticipated that a vehicle-mounted power auger would be used for excavation of the footings. In rocky areas, drilling and blasting may be required for excavation. Drilled pier foundations would require concrete placement.

Spoil material would be used for backfill where suitable. Select backfill material or lean concrete may be used if poor soil conditions are encountered. Spoils not used as backfill would be spread evenly at the site, or taken off site and disposed of properly.

2.6.1.8 Construction Yards

Temporary construction yards would be necessary. It is anticipated that yards would be located in areas with good access to the transmission line and major highways. The yards would serve as field offices, reporting locations for workers, parking space for vehicles, sites for material storage, and stations for equipment maintenance. Some materials may be stored at the Norton Switching Station, within the currently permitted and fenced yard.

2.6.1.9 Structure Assembly and Erection

For new and rebuilt lines, the unassembled structures would be shipped to each structure site by truck. At the site, structures are assembled and hardware and insulators mounted. The assembled structures would be hoisted by a large crane and then dropped into the augured holes or set on the concrete foundation. The crane would hold the structure in place while the foundation is backfilled or the structure is securely anchored to the foundation.

2.6.1.10 Structure Reframing and Re-insulation

For upgraded lines, new structure framing, hardware, and insulators are delivered to each site. This material is assembled and installed on the existing structures. A crane and/or bucket truck would be used to lift the materials and workers to the top of the existing structures.

2.6.1.11 Conductor Installation and Pulling Sites

As part of the structure erection or reframing, insulators, hardware, and stringing sheaves are installed on each structure. For public protection during wire installation, guard structures are positioned over power lines, roads, structures, and other obstacles. Guard structures consist of H-frame structures placed on either side of an obstacle, or bucket trucks with beams extended under the conductor and over the obstacle may be used. These guard structures prevent shield wire, conductor, or equipment from falling on obstacles. In areas where guard structures are not suitable, other safety measures such as barriers, flagmen, or other traffic control would be employed.

For new and rebuilt facilities, a pilot line would be pulled (strung) from structure to structure and threaded through the stringing sheaves at each structure. Next, a larger diameter, stronger steel line would be attached to the pilot line and pulled through all the sheaves. This is called the pulling line. The pulling line is used to "pull in" the heavier conductor or overhead shield wire. This process is repeated until all the shield wires and phase conductors are pulled through the sheaves. For upgraded lines, the existing conductor usually is used to "pull in" the new conductor.

The shield wire and conductor would be strung using powered pulling equipment at one end and power braking or tensioning equipment at the other end. Sites for tensioning equipment and pulling equipment would be approximately 2 to 3 miles apart. These sites, referred to in the specific project alternative descriptions as **pulling sites,** would be in areas of approximately 200 x 300 feet, but size would be widely variable depending upon the area, and upon whether a tensioning site or a pulling site would be located at the pulling site.

Tensioners, line trucks, wire trailers, and tractors that would be needed for stringing and anchoring the shield wire or conductor would be located at tensioning sites. The tensioner, in concert with the puller, maintains tension on the shield wire or conductor. Maintaining tension maintains ground clearance and would be necessary to avoid damage to shield wire, conductor, or any objects below them during stringing operations.

The pulling site generally requires half the area of the tensioning site. A puller, line trucks and tractors that would be needed for pulling and temporarily anchoring the shield wire and conductor would be located at this site. Usually, the same site used for tensioning will later be used for pulling as the conductor is placed sequentially down the line.

2.6.1.12 Cleanup

Construction sites, material storage yards, and access roads would be kept in an orderly condition throughout the construction period. Refuse and trash would be removed from the sites and disposed of in an approved manner. Oils and fuels would not be dumped along the line. Oils or chemicals would be hauled to an approved site for disposal. No open burning of construction trash would occur without BLM or local government approval.

2.6.1.13 Site Reclamation

The right-of-way would be restored as required by the BLM or other jurisdictional agency. Every effort would be made to restore the land to its original contour and to restore natural drainage along the right-of-way as required.

Work sites would be restored using excess materials, vegetation, and topsoil that had been stockpiled for that purpose, if required. Excess soil materials, rock, and other objectionable materials that cannot be used in restoration work would be disposed of by the contractor as approved by the authorized officer and directed by the construction manager.

2.6.1.14 Fire Protection

All applicable fire laws and regulations would be observed during the construction period. All personnel would be advised of their responsibilities under the applicable fire laws and regulations. On BLM land a fire suppression plan will be prepared.

Figure 2-8. Types of Equipment to be Used During Construction

Backhoe

Bulldozer

Crane and Bucket Truck

Low-head Drill Rig

Boom Truck

Bucket Truck

Figure 2-9. Types of Equipment to be Used During Construction

Digger derrick and crane

Bulldozer hauling a structure

Bulldozer hauling a structure

Pulling trailer and utility truck

Bulldozer and boom truck

Pulling trailer and pick-up trucks

2.6.2 Station Construction

The switching stations would be constructed in conformance with National Electrical Safety Code standards. ANSI standards, and industry construction standards (such as AISC, ACI, or AWS) are used for structural design and construction.

Station construction activities would include the following activities:

1. Develop access
2. Perform grading
3. Build wall or fence around facility
4. Install grounding, foundations and conduit
5. Erect structures and bus
6. Install outdoor electrical equipment such as breakers and switches
7. Erect control shed and install communication and protection equipment
8. Perform testing
9. Complete clean-up
10. Perform facility operation and maintenance

2.6.2.1 Notice

Affected parties, permittees, owners, and other regular users of affected lands would be notified in advance of any construction activity that might affect their businesses or operations. This would include, but not be limited to, posting signs for work on or adjacent to roadways, removal and/or cutting of fences, and disturbances to improvements or other land use related structures.

2.6.2.2 Laydown Areas

It is anticipated that the station sites can be used as staging areas during station construction.

2.6.2.3 Work Force

The construction crew for the switchyard would require 8 to 15 workers, including foremen, equipment operators, electrical workers, general laborers, compliance monitors and construction inspectors. The crew would require several vehicles, cranes, and other pieces of equipment, depending upon the activities performed. There may be more than one crew in the switchyard at any one time. Some of the duties of the construction crews may be subcontracted or combined, which could reduce the overall size of the construction force. Construction workers would not be permitted to camp upon public lands while participating in construction activities, unless specifically requested to do so by the contractor and approved by the BLM Authorized Officer.

2.7 Mitigation Measures

A key role of this EA was to develop mitigation strategies to avoid or minimize environmental impacts. The following resource-specific discussions of mitigation measures were developed as part of impact analysis to minimize impacts on environmental receptors. Key mitigation measures focus on use of existing facilities where possible and limiting construction blading to the smallest required area.

Detailed mitigation plans would be prepared to meet county and federal requirements. The Santa Fe County Land Use Department requires submittal of a Terrain Management

Plan to address compliance with the Land Development Code and Terrain Management regulations, Ordinance 1996-3. Additionally, a Stormwater Pollution Prevention Plan would be prepared and implemented during project construction.

2.7.1 Earth Resources

Mitigation of short-term impacts from construction activities shall include implementation of Best Management Practices (BMPs) focused on the prevention of erosion, prevention of disturbance to sensitive areas, and return of areas to natural conditions following the completion of construction.

Mitigation of permanent impacts from new access roads, new lines, and new switching stations would include development of specific mitigation plans (within the Terrain Management and Stormwater Plans required by the county and federal governments).

2.7.2 Biological Resources

Measures to avoid impacts to wildlife habitat include a limited construction zone and BMPs focused on the protection of wildlife (such as measures to protect wildlife from trenches).

Prior to any construction performed during the spring or summer, a detailed survey of the selected alternative area would be completed to ensure that migratory bird nest sites would not be impacted by the project. If nest sites are found, then coordination would be implemented with appropriate land management agencies for these species to develop construction methodologies that would not adversely impact the nesting activities of these species.

In all cases the span between the energized lines is 60 inches or more in width, and the design of the facility has followed guidelines presented in *Suggested Practices for Raptor Protection on Power Lines – The State of the Art in 1996* by the Avian Power Line Interaction Committee (Edison Electric Institute/Raptor Research Foundation 1996).

If the selected alternative involves disturbance of Gunnison's prairie dog colonies within the Santa Fe city limits, coordination and consultation would be initiated with the City of Santa Fe toward the identification of appropriate mitigation measures.

Landscaping specifications would be included in the Terrain Management Plan. Landscaping requirements generally include preservation of significant native trees, shrubs and other vegetation wherever possible and revegetation of disturbed areas. To prevent the spread of noxious weeds, all equipment utilized during construction would be washed prior to entering the project area and seed mixtures used in revegetation of disturbed areas would be certified weed-free.

2.7.3 Land Use and Recreation

Mitigating elements have already been incorporated into the design of each alternative including:

- Avoidance and minimization of impacts to areas with land use constraints and sensitive areas
- Maximizing the use of existing rights-of-way.

- Structural designs that include narrower profiles

Mitigation for land use and recreation sites would focus on minimizing the amount of disturbance in the vicinity of these properties. To the extent possible, structures and access roads would be placed so as to avoid residential and recreational uses and allow conductors to clear or span the features.

2.7.4 Visual Resources

Mitigating elements have already been incorporated into the design of each alternative including:

- Avoidance and minimization of impacts to sensitive areas, and visually sensitive locations.
- Maximizing the use of existing rights-of-way.
- Structural designs that include narrower profiles and self-weathering steel for double-circuit sections.
- Use of non-specular (non-reflective) conductor and screening.

2.7.5 Cultural Resources

The primary mitigation measure for cultural resources is the avoidance of cultural resource sites. Mitigation for cultural sites would include minimizing the amount of disturbance in the vicinity of these properties. New structures and access roads would be placed so as to avoid cultural sites and allow conductors to clear or span the features.

2.7.6 Electric and Magnetic Fields

Knowledge of the phenomenon, grounding practices, and the availability of construction measures means that magnetic induction effects from any transmission line can be minimized. The proposed transmission line would be designed and constructed to meet or exceed all applicable requirements of the National Electrical Safety Code (NESC). As a routine matter, PNM would ground all fences and gates within the line right-of-way. In addition, PNM would investigate and correct any reported induced shocks on other fences or buildings associated with the proposed action. Construction measures, such as grounding and breaking electrical continuity, implemented for electric field induction would reduce magnetic field induction effects.

New lines are designed to reduce corona generation. However, if any corona effects (audible noise or radio or television interference) problems are reported, normal transmission line maintenance activities would locate and correct these problems as they occur.

2.8 Comparison of Alternatives

Table 2-4 contains a comparison of the alternatives. These are summarized for each resource below.

2.8.1 Project Reliability and Ability to Meet Purpose and Need

The No Action alternative does not meet the purpose and need of the project, because the existing electrical transmission system is reaching the limits of its capacity, which leaves

the Santa Fe and Las Vegas area communities vulnerable to potential electrical system problems.

The current system transfer capacity, with all lines and other critical systems in service (known as *n-0* conditions), is 180MW. The current system has the ability to serve the Santa Fe/Las Vegas area until 2012 or 2013, as long as all lines remain in service. However, if one line or other critical system goes out of service (*n-1* conditions), the existing system would most likely fail to meet voltage and thermal loading performance criteria. In *n-2* conditions, with two lines or other equipment out of service, there is a high potential for system failure. In addition, maintenance and repair of lines currently can take place only during off-peak load periods.

Each action alternative proposed for this project provides at least the minimum requirement of a 40MW increase in electric transfer capacity; therefore, each action alternative meets the purpose and need for the project. In addition, each action alternative would provide a new independent source of power that would mitigate problems and increase the transmission system's reliability.

2.8.2 Earth Resources

The evaluation of impacts on earth resources is based on GIS overlay analyses of alternatives onto soils mapping information. Areas (in acres) of new disturbance of soils ("severe" erosion potential) were calculated for each alternative (and alternative impact type) as a gauge of the degree of impact. Arroyo crossings, by both existing and new alternatives, were counted as an indicator of impacts to water resources.

2.8.2.1 Alternative A

Impacts to soils with severe water and wind erosion potential from Alternative A comprise a total of 16.4 and 19.2 acres, respectively. The greatest impacts to new disturbance area soils are a result of pulling sites. This alternative does not require new access roads or switching stations and there are no impacts from these facilities to soils or arroyos. There are eight existing arroyo crossings and new crossings are not necessary with this alternative. Alternative A is ranked as having the least impacts (along with F) to earth resources.

2.8.2.2 Alternative F

Impacts to soils with severe water and wind erosion potential from Alternative F comprise a total of 14.6 and 18.6 acres, respectively. The greatest impacts to new disturbance area soils are a result of pulling sites. Switching stations are indicated to impact 1.7 acres of new disturbance area. This alternative does not require new access roads and there are no impacts from access roads to soils or arroyos. There are six existing arroyo crossings and new crossings are not necessary with this alternative. Alternative F is ranked as having the least impacts (along with A) to earth resources.

2.8.2.3 Alternative O

Impacts to soils with severe water and wind erosion potential from Alternative O comprise a total of 19.3 and 27.5 acres, respectively. The greatest impacts to new disturbance areas are a result of pulling sites. New access roads are indicated to impact 2.8 acres of new disturbance area. This alternative does not require new switching stations and there are no impacts from these facilities to new disturbance areas or arroyos. Alternative O has six arroyo crossings. Four of these are existing crossings and two are

new crossings. Alternative O is ranked as having greater impacts to earth resources than alternatives A and F. Alternative O is indicated to have fewer impacts to earth resources than Alternative S.

2.8.2.4 Alternative S

Impacts to soils with severe water and wind erosion potential from Alternative S comprise a total of 23.6 and 46.1 acres, respectively. The greatest impacts to new disturbance areas are a result of pulling sites. New access roads are indicated to impact 5.5 acres of new disturbance area. New switching stations are indicated to impact 2.2 acres of new disturbance area. Alternative S has nine arroyo crossings. Three of these are existing crossings and six are new crossings. Alternative S is ranked as having the greatest impacts to earth resources of all the alternatives.

2.8.3 Biological Resources

The evaluation of impacts to biological resources is based on GIS overlay analyses of vegetation mapping information and biological surveys. Areas (in acres) of new disturbance of vegetation were calculated for each alternative (and alternative impact type) as a gauge of the degree of impact. Wildlife impacts are generally greatest where there are permanent impacts from new access roads and switching stations.

2.8.3.1 Alternative A

Total impacts to new disturbance area vegetation comprise 34.3 acres, of which 29.5 acres fall into the Juniper Savanna vegetation type. The greatest impacts to new disturbance area vegetation are a result of pulling sites. Wildlife species with agency status were observed in areas traversed by this alternative. This alternative does not require new access roads or switching stations and there are no impacts from these facilities to vegetation or wildlife habitat. Alternative A is ranked as having the least impacts (along with F) to biological resources.

2.8.3.2 Alternative F

Total impacts to new disturbance area vegetation comprise 34.2 acres, of which 30.1 acres fall into the Juniper Savanna vegetation type. The greatest impacts to new disturbance area vegetation are a result of pulling sites. Switching stations are indicated to impact 1.7 acres of new disturbance area vegetation. Wildlife species with agency status were observed in areas traversed by this alternative. This alternative does not require new access roads and there are no impacts from access roads to vegetation or wildlife habitat. Alternative F is ranked as having the least impacts (along with A) to biological resources.

2.8.3.3 Alternative O

Total impacts to new disturbance area vegetation comprise 38.6 acres, of which 28.7 acres fall into the Juniper Savanna vegetation type. The greatest impacts to new disturbance area vegetation are a result of pulling sites. Wildlife species with agency status were observed in areas traversed by this alternative. New access roads are indicated to impact 2.8 acres of new disturbance area vegetation. New access roads would also have permanent impacts to wildlife habitat. The alternative traverses numerous prairie dog colonies along Airport Road. This alternative does not require new switching stations and there are no impacts from these facilities to new disturbance area vegetation or wildlife habitat. Alternative O is ranked as having greater impacts to biological resources

than alternatives A and F. Alternative O is indicated to have fewer impacts to biological resources than Alternative S.

2.8.3.4 Alternative S

Total impacts to new disturbance area vegetation comprise 76.1 acres, of which 56.9 acres fall into the Juniper Savanna vegetation type. The greatest impacts to new disturbance area vegetation are a result of pulling sites. Wildlife species with agency status were observed in areas traversed by this alternative. New access roads are indicated to impact 5.5 acres of new disturbance area vegetation. New switching stations are indicated to impact 2.2 acres of new disturbance area vegetation. New access roads and new switching stations would also have permanent impacts to wildlife habitat. Alternative S is ranked as having the greatest impacts to biological resources of all the alternatives.

2.8.4 Land Use and Recreation

Land use and recreation analysis focused on compatibility of alternatives with the Resource Management Plan on BLM lands and the potential for conflicts of new right-of-way with existing and new development.

2.8.4.1 Alternative A

Alternative A would not require any new right-of-way on non-BLM lands and avoids land use impacts. Alternative A is considered compatible with the Resource Management Plan, because it avoids special management areas and utilizes an existing utility corridor. Alternative A is ranked as having the least impacts to land and recreation resources of all the alternatives.

2.8.4.2 Alternative F

Alternative F would include the proposed Zia North Switching Station, which would be in conflict with the Agua Fria Traditional Historic Community. Alternative F is ranked as having the greatest impacts to land and recreation resources of all the alternatives.

2.8.4.3 Alternative O

Alternative O would require 6 miles of new 50-foot-wide right-of-way; however, by utilizing the existing right-of-way along Airport Road, land use impacts to residential areas would be minimized. Alternative O is ranked as having among the least impacts to land and recreation resources of all the alternatives.

2.8.4.4 Alternative S

Alternative S would require 13.5 miles of new 50-foot-wide right-of-way, and would be in conflict with planned Rancho Viejo development lots. Alternative S is ranked as having among the greatest impacts to land and recreation resources of all the alternatives.

2.8.5 Environmental Justice

Alternatives A, O, and S avoid disproportionate impacts to low-income and minority communities, while Alternative F would result in a disproportionate impact due to introducing a new switching station in the Agua Fria community.

Alternative F would result in cumulative impacts due to the combination of a new switching station with past electric and transportation infrastructure.

2.8.6 Visual Resources

The evaluation of visual impacts centered on the anticipated degree of visual contrast associated with project alternatives as seen from sensitive vantage points. Visual impacts have been determined in a consistent manner that acknowledges BLM VRM contrast and visibility on undeveloped, rural BLM lands as well as contrast from developing rural residential lands and developed urban areas off of BLM land.

2.8.6.1 Alternative A

The anticipated visual contrast of Alternative A to residential viewers within foreground distance zones would be entirely weak, resulting from the upgrade of the AN and NZ lines. Alternative A is ranked as having the least impacts to visual resources of all the alternatives.

2.8.6.2 Alternative F

While much of Alternative F is anticipated to result in weak visual contrast due to the upgrade of the AN and NZ lines, this alternative is anticipated to result in a strong visual contrast at the proposed Zia North Switching Station site in the Agua Fria community. Alternative F would result in cumulative impacts due to the combination of a new switching station with past electric and transportation infrastructure. Alternative F is ranked as having the greatest visual impact.

2.8.6.3 Alternative O

Visual contrast associated with Alternative O would range from weak (resulting from the upgrade of the AN line) to moderate (due to the upgrade of a distribution line along Airport Road). The existing transmission line facilities are skylined as viewed from the Municipal Recreation Complex. The proposed new transmission lines on the west and south sides of the complex would also be skylined, resulting in cumulative impacts to the visual setting and recreation experience. Alternative O is ranked as having among the least impacts to visual resources of all the alternatives.

2.8.6.4 Alternative S

Visual contrast associated with Alternative S ranges from weak (resulting from the upgrade of the AN line) to moderate-strong (due to the construction of a new transmission line). The existing transmission line facilities are skylined as viewed from the Municipal Recreation Complex. The proposed new transmission line corridors on the west and south sides would also be skylined, resulting in cumulative impacts to the visual setting and recreation experience, as described under Alternative O. Alternative S is ranked as having the second-greatest visual impact, after Alternative F.

2.8.7 Cultural Resources

It is anticipated that because archeological resources would be avoided, none of the alternatives would affect archeological resources, and therefore no differences exist between alternatives.

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Table 2-4. Comparison of Alternative Effects

	Alternative A									Alternative F									Alternative O									Alternative S									Least Impact Alternative (by Resource)
	Entire Alternative Total length: 13.1 miles Miles of new line: 0 Estimated Cost: $12.0 million					**BLM Lands Only** Total length: 6.17 miles Miles of new line: 0				**Entire Alternative** Total length: 11 miles Miles of new line: 0 Estimated Cost: $14.0 million					**BLM Lands Only** Total length: 6.17 miles Miles of new line: 0				**Entire Alternative** Total length: 16.9 miles Miles of new line: 6 Miles of distribution rebuild: 2.5 Estimated Cost: $13.3 million					**BLM Lands Only** Total length: 6.7 miles Miles of new line: 0				**Entire Alternative** Total length: 25.1 miles Miles of new line: 13.6 Estimated Cost: $14.3 million					**BLM Lands Only** Total length: 6.7 miles Miles of new line: 0				
Project Facilities[1]	**Structures**	**New Access**	**Pulling Sites**	**Switching Stations**	**Total Acres**	**Structures**	**New Access**	**Pulling Sites**	**Total Acres**	**Structures**	**New Access**	**Pulling Sites**	**Switching Stations**	**Total Acres**	**Structures**	**New Access**	**Pulling Sites**	**Total Acres**	**Structures**	**New Access**	**Pulling Sites**	**Switching Stations**	**Total Acres**	**Structures**	**New Access**	**Pulling Sites**	**Total Acres**	**Structures**	**New Access**	**Pulling Sites**	**Switching Stations**	**Total Acres**	**Structures**	**New Access**	**Pulling Sites**	**Total Acres**	
Project Facilities – Quantities	94	0	14	0		40	0	7		79	0	12	1		40	0	7		114	4.8 miles	24	0		45	0	7		179	13.15 miles	40	1		38	0	7		
Project Facilities – Construction Disturbance Footprint (in Acres)	12.0	0	34.2	0	46.2	4.9	0	17.6	22.5	10.1	0	34.4	2.1	46.6	4.9	0	17.6	22.5	14.6	7	45.1	0	66.7	4.9	0	18.2	23.1	23.1	19.1	71.4	2.1	115.7	4.9	0	18.2	23.1	**A** has the smallest construction footprint.
Soils: Severe Water Erosion in New Disturbance Area	3.6	0	12.8	0	16.4	3.6	0	11.1	14.7	3.5	0	11.1	1.7	16.3	3.6	0	11.1	14.7	4	.9	14.4	0	19.3	3.5	0	11.3	14.8	4.8	2.3	16.5	0	23.6	3.5	0	11.3	14.8	**A** and **F** minimize soil erosion.
Soils: Severe Wind Erosion in New Disturbance Area	5	0	14.2	0	19.2	3.4	0	10.2	13.6	4.4	0	12.5	0	16.9	3.4	0	10.2	13.6	5.9	2.8	18.8	0	27.5	4	0	12.8	16.8	8.5	6.3	29.2	2.1	46.1	4	0	12.8	16.8	
Soils Rank					**1**									**1**									**2**									**3**					
Vegetation: Acres Disturbed																																					
Piñon-Juniper Woodland	.1	0	.2	0	.3	0	0	0	0	.1	0	0	0	.1	0	0	0	0	0	0	.2	0	.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**A** and **F** minimize vegetation impacts.
Juniper Savanna	6.7	0	22.8	0	29.5	3.8	0	14.0	17.8	6.2	0	22.3	1.6	30.1	3.8	0	14.0	17.8	5.8	1.6	21.3	0	28.7	3.8	0	14.7	18.5	12.8	3.2	38.9	2.0	56.9	3.8	0	14.7	18.5	
Plains-Mesa Grassland	.8	0	2.4	0	3.2	.3	0	1.3	1.6	.8	0	2.4	.1	3.3	.3	0	1.3	1.6	1.5	1.2	5.8	0	8.5	.7	0	3.6	4.3	3.0	2.3	10.6	.2	16.1	.7	0	3.6	4.3	
Arroyo Riparian/ Scrubland	0	0	.8	0	.8	0	0	.7	.7	0	0	.7	0	.7	0	0	.7	.7	0	0	.7	0	.7	0	0	.7	.7	.6	0	2.3	0	2.9	0	0	.7	.7	
Montane Riparian	0	0	.5	0	.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.5	0	.5	0	0	0	0	.2	0	0	0	.2	0	0	0	0	
Total Vegetation Acres					**34.3**				**20.1**					**34.2**				**20.1**					**38.6**				**23.5**					**76.1**				**23.5**	
Vegetation Rank					**1**									**1**									**2**									**3**					
Arroyo (and River) Crossings	8 existing crossings					2 existing crossings				6 existing crossings					2 existing crossings				6 crossings (4 existing, 2 new)					2 existing crossings				9 crossings (3 existing, 6 new)					2 existing crossings				**A** and **F** cross avoid new arroyo crossings.
Arroyo Crossings Rank					**1**									**1**									**2**									**3**					
Wildlife (Threatened, Endangered, and Sensitive Species)	Gray vireo: three observed along AN line on BLM lands Loggerhead shrike: territory discovered on NZ segment on non-BLM lands Gunnison's prairie dog: colony observed in Agua Fria area					Gray vireo: three observed along AN line				Gray vireo: three observed along AN line on BLM lands Loggerhead shrike: territory discovered on NZ segment on non-BLM lands Gunnison's prairie dog: colony observed in Agua Fria area					Gray vireo: three observed along AN line				Gray vireo: three observed along AN line on BLM lands Gunnison's prairie dog: colonies observed along Airport Road Burrowing owl: noted near prairie dog colonies along Airport Road					Gray vireo: three observed along AN line				Gray vireo: three observed along AN line on BLM lands; one habitat area observed along SL line Burrowing owl: noted in kangaroo rat mound areas along SL line					Gray vireo: three observed along AN line				Impacts to TES species are similar for all alternatives. Mitigation is available.

Note: Data gathered on Soils and Vegetation acreage included previously disturbed area and new disturbance area. Data reported on this table includes only new disturbance area.
[1] Project facility dimensions: Structure Sites: 75 x 75 feet; New Access Roads: 12 feet across; Pulling Sites 200 x 300 feet each; Switching Stations: 260 x 360 feet each.

	Alternative A		Alternative F		Alternative O		Alternative S		Least Impact Alternative (by Resource)
	Entire Alternative Total length: 13.1 miles Miles of new line: 0 Estimated Cost: $12.0 million	**BLM Lands Only** Total length: 6.17 miles Miles of new line: 0	**Entire Alternative** Total length: 11 miles Miles of new line: 0 Estimated Cost: $14.0 million	**BLM Lands Only** Total length: 6.17 miles Miles of new line: 0	**Entire Alternative** Total length: 16.9 miles Miles of new line: 6 Miles of distribution rebuild: 2.5 Estimated Cost: $13.3 million	**BLM Lands Only** Total length: 6.7 miles Miles of new line: 0	**Entire Alternative** Total length: 25.1 miles Miles of new line: 13.6 Estimated Cost: $14.3 million	**BLM Lands Only** Total length: 6.7 miles Miles of new line: 0	
Archaeological Resources (Sites within a 200-foot corridor on existing and 500-foot corridor on new line)	Number of sites: 10 Number of recommended NRHP-eligible sites: 6	Number of sites: 5 Number of recommended NRHP- eligible sites: 4	Number of sites: 8 Number of recommended NRHP-eligible sites: 4	Number of sites: 5 Number of recommended NRHP- eligible sites: 4	Number of sites: 6 Number of recommended NRHP-eligible sites: 5	Number of sites: 5 Number of recommended NRHP- eligible sites: 4	Number of sites: 7 Number of recommended NRHP- eligible sites: 5 Number of recommended NRHP-ineligible sites: 1	Number of sites: 5 Number of recommended NRHP- eligible sites: 4	All alternatives have avoidance potential.
Land Use	The double circuit portion of Alternative A along the NZ line runs adjacent to the Puesta Del Sol, Piñon Hills, and Town & Country neighborhoods and through the Tres Arroyos Planning Area. Planned developments crossed include the Roybal, Rancho de Los Ninos, and Nava Ade' Subdivision. No new right-of-way required on non-BLM lands.	New right-of-way required: up to 35 feet additional right-of-way along 6.17 miles of AN/NZ lines. Alternative avoids any special management use area and utilizes existing utility corridor along Buckman Road. BLM lands in T17N/R8E, Section 35, are identified for disposal.	The double circuit portion of Alternative F along the NZ line runs adjacent to the Puesta Del Sol and Piñon Hills neighborhoods and through the Tres Arroyos Planning area. Planned developments crossed include the Roybal and Rancho de Los Ninos Subdivision. Alternative contains impact of new switching station in Agua Fria. No new right-of-way required on non-BLM land.	New right-of-way required: up to 35 feet additional right-of-way along 6.17 miles of AN/NZ lines. Alternative avoids any special management use area and utilizes existing utility corridor along Buckman Road. BLM lands in T17N/R8E, Section 35, are identified for disposal.	New corridor along Airport Road is adjacent to Vista Primera, Vista Verde Mobile Home, Cedar Creek Apartments, Country Club Estates, Tierra Real Mobile Home, Country Club Estates, Country Club Apartments, West Meadow, Jemez Road, Rancho Zia Mobile Home Park, Vereda de Valancia, Villitas Mobile Home Park, and Cedar S Mobile Home Subdivisions. Planned developments crossed by Alternative O include the Nava Ade' development and the Valdes Economic Development Park. The alternative is adjacent to the Santa Fe Crossing and Los Soleras developments. North of Airport Road, the alternative crosses through the Associated Asphalt industrial development. Alternative O requires 6 miles of new 50-foot right-of-way.	New right-of-way required: up to 35 feet additional right-of-way along 6.7 miles of AN line. Alternative avoids any special management use area and utilizes existing utility corridor along Buckman Road. BLM lands in T17N/R8E, Section 35, are identified for disposal.	New corridor south of I-25 is adjacent to the Pueblos del Rodeo, Vista Primera, and Pueblos del Sol neighborhoods. Alternative passes through Rancho Viejo, the Thornburg Master Plan, and Komis Business Park developments. The alternative is adjacent to the Sonterra and San Cristobal Village developments. North of Airport Road, the alternative crosses through the Associated Asphalt industrial development. Alternative requires 13.2 miles of new 50-foot right-of-way. New right-of-way in planned Rancho Viejo lots.	New right-of-way required: up to 35 feet additional right-of-way along 6.7 miles of AN line. Alternative avoids any special management use area and utilizes existing utility corridor along Buckman Road. BLM lands in T17N/R8E, Section 35, are identified for disposal.	Alternative **A** avoids land use impacts on non-BLM lands and is compatible with resource management plan on BLM lands.
Land Use Rank	**1**		**4**		**2**		**3**		
Environmental Justice	No disproportionate impact.	No disproportionate impact.	Disproportionate impact due to population 28% below poverty level in switching station area. These are considered cumulative impacts to Agua Fria.	No disproportionate impact.	No disproportionate impact.	No disproportionate impact.	No disproportionate impact.	No disproportionate impact.	Alternatives **A, O,** and **S** avoid disproportionate impacts to low-income and minority communities.
EJ Rank	**1**		**2**		**1**		**1**		

	Alternative A								Alternative F								Alternative O								Alternative S								
	Entire Alternative Total length: 13.1 miles Miles of new line: 0				**BLM Lands Only** Total length: 6.17 miles Miles of new line: 0				**Entire Alternative** Total length: 11 miles Miles of new line: 0				**BLM Lands Only** Total length: 6.17 miles Miles of new line: 0				**Entire Alternative** Total length: 16.9 miles Miles of new line: 6 Miles of distribution rebuild: 2.5				**BLM Lands Only** Total length: 6. 7 miles Miles of new line: 0				**Entire Alternative** Total length: 25.1 miles Miles of new line: 13.6				**BLM Lands Only** Total length: 6. 7 miles Miles of new line: 0				
	Visual Contrast of Transmission Lines and Switching Stations								**Visual Contrast of Transmission Lines and Switching Stations**								**Visual Contrast of Transmission Lines and Switching Stations**								**Visual Contrast of Transmission Lines and Switching Stations**								
Visual Resources	Weak	Moderate	Moderate to Strong	Strong	Weak	Moderate	Moderate to Strong	Strong	Weak	Moderate	Moderate to Strong	Strong	Weak	Moderate	Moderate to Strong	Strong	Weak	Moderate	Moderate to Strong	Strong	Weak	Moderate	Moderate to Strong	Strong	Weak	Moderate	Moderate to Strong	Strong	Weak	Moderate	Moderate to Strong	Strong	
Foreground* Landscape/ Acres	3,650	0	0	0	1,320	0	0	0	3,080	0	0	125	1,320	0	0	0	1,320	1,210	1,630	0	1,320	0	0	0	2,560	0	4,510	0	1,320	0	0	0	
Middleground* Landscape / Acres	12,220	0	0	0	3,830	0	0	0	10,280	0	0	1,420	3,830	0	0	0	3,830	4,020	5,520	0	3,830	0	0	0	8,040	0	14,080	0	3,830	0	0	0	Alternative **A** minimizes visual impacts to the project setting and residential viewers.
Foreground Residential Views/ Number of Residences	630	0	0	0	3	0	0	0	260	0	0	50	3	0	0	0	3	1,780	0	0	3	0	0	0	320	0	210	0	3	0	0	0	
Middleground Residential Views / Number of Residences	1,830	0	0	0	52	0	0	0	2,330	0	0	1,850	52	0	0	0	52	5,230	37	0	52	0	0	0	2,160	0	1,620	0	52	0	0	0	
Views from Roadways: Roads Crossed (or Paralleled)	Existing Lines: 1. Richards Avenue 2. Rodeo Road 3. Cerrillos Road 4. Rufina Road 5. NM-599 6. Agua Fria Road 7. Alameda Road 8. the Caja del Rio Road				Existing Lines: Buckman Road				Existing Lines: 1. NM-599 2. Agua Fria Road 3. Alameda Road 4. Caja del Rio Road				Existing Lines: Buckman Road				New Lines: 1. NM-599 through an industrial area Existing Lines: 2. Airport Road (parallel) 3. Cerrillos Road 4. Richards Road				Existing Lines: Buckman Road				New Lines: 1. Airport Road 2. NM-599 west of I-25, (primarily parallel) 3. I-25 north of the NM-599 interchange 4. North Highway 14, and Vista del Monte				Existing Lines: Buckman Road				Alternative **A** minimizes impacts to views from the road by utilizing existing lines.
BLM/VRM Compliance					Alternative compatible with existing conditions and interim VRM Class III or IV due to weak visual contrast.								Alternative compatible with existing conditions and interim VRM Class III or IV due to weak visual contrast.								Alternative compatible with existing conditions and interim VRM Class III or IV due to weak visual contrast.								Alternative compatible with existing conditions and interim VRM Class III or IV due to weak visual contrast.				All alternatives are compatible with BLM interim VRM classes.
Cumulative Visual Impacts									Cumulative impacts would result from the proposed Zia North Switching Station in Agua Fria community.								The proposed new transmission line corridors on the west and south sides of the Municipal Recreation Complex would result in cumulative impacts to the visual setting and recreation experience.								The proposed new transmission line corridors on the west and south sides of the Municipal Recreation Complex would result in cumulative impacts to the visual setting and recreation experience.								
Visual Resources Rank	**1**								**4**								**2**								**3**								

* Foreground: within ¼ mile
Middleground: within 1 mile

Chapter 3. Affected Environment and Environmental Consequences

Chapter 3 presents the affected environment for the four Project Power (project) alternatives and the No Action alternative, described in Chapter 2, as well as the environmental consequences of each alternative. The ***Affected Environment*** sections describe the current conditions of each resource and future plans that may be subjected to the impacts from the alternatives. The ***Environmental Consequences*** sections address the issues raised in scoping (see Chapter 1) in terms of direct and indirect impacts from each alternative, cumulative impacts, and mitigation.

The resources inventoried and described in this chapter include the following:

3.1 Earth Resources

- Climate and air quality
- Geology
- Soils
- Water Resources

3.2 Biological Resources

- Vegetation
- Wildlife
- Threatened, Endangered and other Special Status Species (TES)

3.3 Land Use, Socio-economics and Recreation

3.4 Environmental Justice

3.5 Visual Resources

3.6 Cultural Resources

3.7 Electric and Magnetic Fields and Noise

3.8 Cumulative Impacts

Direct Impact Assessment Techniques

Direct impacts are defined as those that:

- Are caused by the action
- Occur at the same time and place (40 CFR 1508.8)

Techniques to assess direct impacts of the alternatives include GIS mapping, field surveys, footprint analysis, and modeling.

- The first step in the assessment was to compile data, mapping, aerial photography and satellite imagery, and digital elevation data.

- Footprint and construction zone were determined using a GIS overlay process
  - The combined footprint of alternatives includes the area required for structure sites and construction (75 x 75 feet), access roads (12 feet wide), pulling sites (200 x 300 feet), and switching stations (260 x 360 feet).
  - The construction footprint for each project facility was spaced according to the descriptions provided in Chapter 2.
  - Construction footprint areas for every individual project facility site were initially evaluated for the extent of existing ground disturbance. Areas that have been previously disturbed by a transmission line or other construction were distinguished from areas that are relatively undisturbed, where new disturbance would occur due to the construction of the alternative. The determination of areas previously disturbed versus new areas of disturbance was based on the review of 2003 aerial photography.
  - Impacts to alternatives have been quantified based on the overlay of the construction footprints on resource mapping. Impacts to previously disturbed areas are separated from new areas of construction.

Indirect Impact Assessment

Indirect impacts are defined as impacts that:

- Are caused by the action
- Are later in time or farther removed in distance
- Are reasonably foreseeable
- May include growth-inducing effects (40 CFR 1508.8)

The effects of soil erosion and sedimentation on downstream water features are an example.

Cumulative Impact Assessment

Cumulative impacts:

- Result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions (40 CFR 1508.7)
- May occur regardless of what agency or person undertakes such other action

The combined effects of the alternative with other future impacts may cause cumulative effects.

Mitigation Planning

A key role of the EA is to develop mitigation strategies to avoid or minimize environmental impacts.

3.1 Earth Resources

The following sections provide descriptions of the affected environment for climate and air quality, geology, soils, and water resources of the project area,

and the environmental consequences and mitigation for alternatives A, F, O, and S.

3.1.1 Climate and Air Quality

3.1.1.1 Affected Environment

The climate in north-central New Mexico is classified as arid to semi-arid with average annual precipitation ranging from 13 inches in Santa Fe to 10 inches in the northern project area. Almost one-third of yearly precipitation occurs in the form of short-lived, torrential afternoon rains in July and August. Summer precipitation in the project area often takes the form of violent storms that can generate inches of rain in short periods of time. Summers are hot (average of 84 degrees Fahrenheit monthly high temperatures) and winters cold (average of 21 degrees F monthly lows). The yearly average high temperature in Santa Fe is 64 degrees F and the yearly average low temperature is 36 degrees F.

The region currently meets air quality standards (NMED 2002). Windblown natural dust occurs occasionally and temporarily raises the level of total suspended particulates.

3.1.1.2 Environmental Consequences

The No Action alternative would result in no change to area air quality on BLM land or non-BLM land. During construction of any action alternative, and prior to any re-establishment of vegetative cover in areas of surface disturbance, increased fugitive dust could occur along the access roads, which would be temporary in nature. No emission sources are proposed.

3.1.2 Geology

3.1.2.1 Affected Environment

The project area is located along the eastern edge of the Caja del Rio Plateau in the Española Basin, a broad geographic province which lies between the Sangre de Cristo and the Jemez Mountain ranges in Santa Fe County, New Mexico. Elevations in the project area range from 6,100 feet near Norton Switching Station, to 6,400 feet south of Buckman Road, to 6,600 feet within the City of Santa Fe.

The geology of the project area is characterized by its location within the west edge of the Rio Grande Rift Zone. The Española Basin that encompasses the project area was formed from tectonic activities that pulled apart the crust and allowed the basin area to drop. Fault zones and historic volcanic activity are characteristic along the edges of the Rift Zone.

The underlying geology of the project area primarily consists of Quaternary and Tertiary deposits of the Santa Fe Group, with basaltic intrusions nearer the Santa Fe River and in the central project area. The Santa Fe Group is a complex of alluvial fans that were deposited during the formation of the Española Basin. Variations in deposits occur due to differing sources of sediment material and differing amounts of lava flows or volcanic ash. The sediment of the Santa Fe group is by and large soft and easily eroded. In areas containing large amounts of volcanic ash, badland-type topography is present.

In the project area, the Santa Fe Group contains the Tesuque and Ancha Formations. The Tesuque Formation is the main aquifer in the Santa Fe area. The sediments of this formation consist of several thousand feet of pinkish-tan soft granite wash, silty sandstone and minor conglomerate and siltstone. The Ancha Formation is a high, gently sloped layer of gravel deposited on top of the Tesuque Formation up to 400 feet thick. It consists of pinkish-tan, angular and sub-angular fine to coarse pebble gravels that are mostly derived from granite and mixed with minor amounts of silt and sand.

3.1.2.2 Environmental Consequences

Construction of project alternatives on BLM land or non-BLM land would generally be limited to surficial disturbance of project area soils. New structures would require hole depths typically equal to10 percent of the aboveground height, plus 2 feet, and may penetrate small areas of Santa Fe Group formations. None of the proposed project alternatives including No Action would be affected by local geology.

3.1.3 Soils

3.1.3.1 Affected Environment

The project area includes two general soil associations; these consist of soils located on dissected piedmont plains, and soils found on mesas, cinder cones, and basalt flows, based on USDA Soil Conservation Service surveys (January 2004). The primary issues associated with these soils are their potential for water and wind-related erosion.

Project area soil formation is affected by the arid to semi-arid climate and source materials. Water and wind erosion hazards in the project area are generally moderate to severe. Soils have been modified from over-grazing and off-road vehicles in some areas, reducing their ability to support native grasses and other ground cover. The characteristics of each soil type in the project area that are crossed by alternatives are described on Table 3-1, including levels of potential water and wind erosion.

Table 3-1. Soil Types in the Project Area

Soil Name	Map Symbol	Description (surface to lower)	Slope	Water Erosion Hazard	Soil Blowing Hazard
Apache stony fine sandy loam	AP	stony fine sandy loam; stony sandy clay loam; fractured basalt rock	1-15%	moderate	slight
Bluewing gravelly sandy loam	BH/Bg	gravelly sandy loam and gravelly loam; very gravelly sandy loam and gravelly loam	0-5%	severe	slight
Fivemile loam	FF/Fe	loam; silt loam; arroyos, Alamo Creek "floodplain"	0-5%	moderate	moderate
Harvey-Cerrillos association, undulating	HR/HC	Harvey: fine sandy loam - 40%; Cerillos: fine sandy loam - 30%	1-9%	moderate	moderate

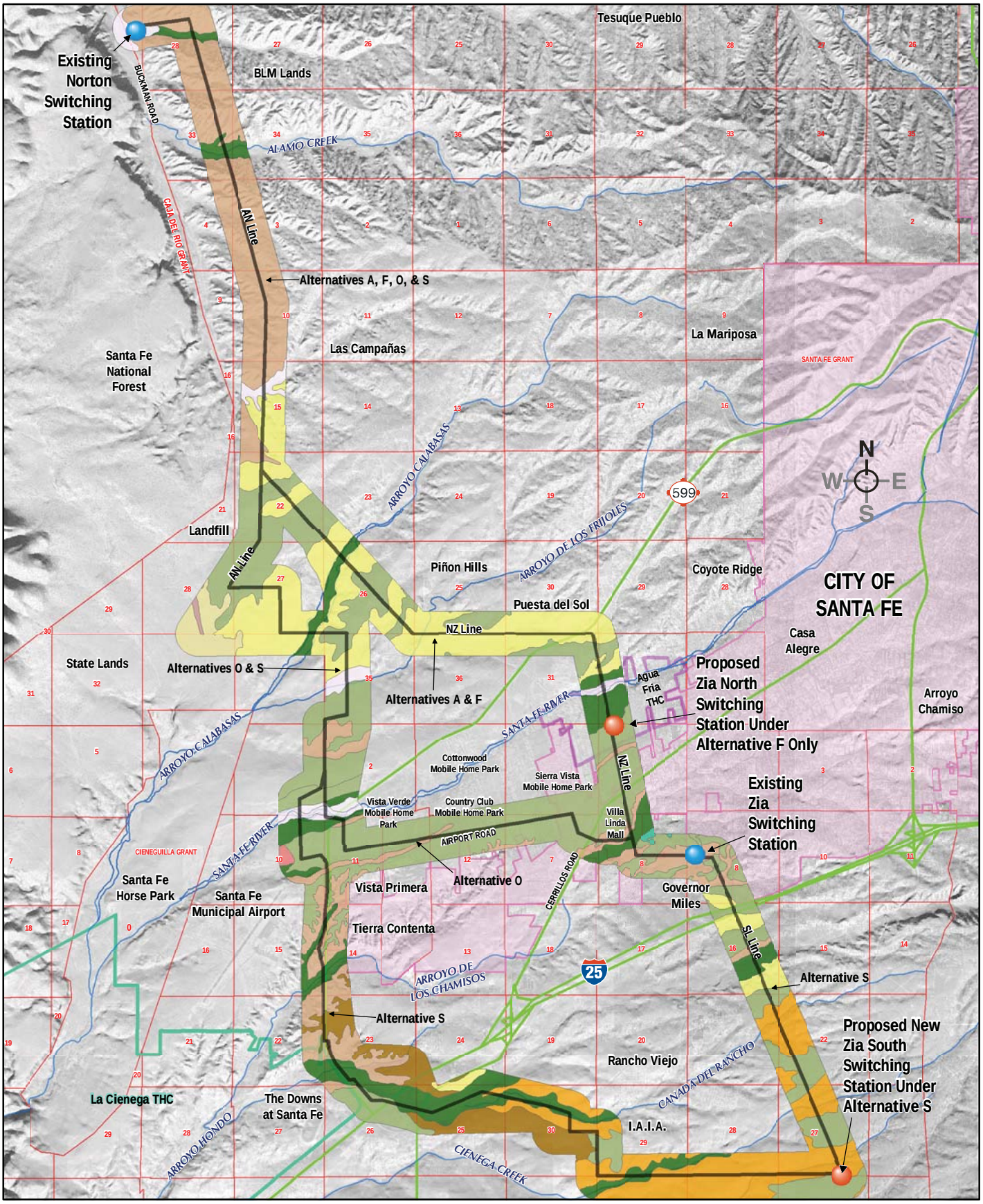
Soil Name	Map Symbol	Description (surface to lower)	Slope	Water Erosion Hazard	Soil Blowing Hazard
Panky fine sandy loam	PB/Pa	fine sandy loam; clay loam; sandy clay loam with high content of lime	0-5%	moderate	severe
Pojoaque-Panky association, rolling	PK	loam; clay loam; sandy clay loam with high content of lime	0-9%, 9-25%	moderate; severe	moderate; severe
Pojoaque-Rough Broken Land complex	PN/Pm	sandy clay loam; gravelly sandy clay loam; calcareous sandy clay loam	9-25%	severe	severe
Silver-Pojoaque association, undulating	SP	Silver: loam; clay loam; silty clay loam Pojoaque: clay loam; gravelly sandy clay loam and sandy clay loam	1-9%	moderate to severe	moderate
Silver loam	SR	loam; clay, silty clay, and silty clay loam; very fine sandy loam	0-10%	moderate	moderate

Soils Crossed by Project Alternatives

Soils crossed by project alternatives are illustrated on Map 3-1, and quantified on Table 3-2 for BLM lands and non-BLM lands.

Table 3-2. Soil Types Traversed by Alternatives (linear feet)

Alternative		A		F		O		S	
Soil Type	Soil Code	BLM	Non-BLM	BLM	Non-BLM	BLM	Non-BLM	BLM	Non-BLM
Apache stony fine sandy loam	AP	0	0	0	0	0	346	0	783
Bluewing gravelly sandy loam (severe water erosion)	BH	1,340	1,293	1,340	628	1,691	3,458	1,691	3,458
Fivemile loam	FF	1,536	3,770	1,536	0	1,538	2,982	1,538	19,313
Harvey-Cerrillos association, undulating	HR	0	0	0	0	0	0	0	2,130
Panky fine sandy loam (Severe wind erosion)	PB	1,195	12,510	1,195	6,900	4,048	45,662	4,048	44,809
Pojoaque-Panky association, rolling	PK	4,406	16,003	4,406	16,003	3,989	20,995	3,989	23,656
Pojoaque-Rough Broken Land complex (Severe water and wind erosion)	PN	24,111	3,345	24,111	0	24,113	11,324	24,113	19,241
Silver loam	SR	0	0	0	0	0	4,883	0	4,883
Silver-Pojoaque association, undulating	SP	0	0	0	0	0	0	0	22,945



LEGEND

- Existing PNM Switching Station Utilized in Alternative
- Proposed Switching Station
- Agua Fria Fine Sandy Loam
- Apache Stony Fine Sandy Loam
- Bluewing Gravelly Sandy Loam
- Cerrillos Fine Sandy Loam
- Fivemile Loam
- Harvey-Cerrillos Association, Undulating
- Panky Fine Sandy Loam
- Pojoaque-Panky Association, Rolling
- Pojoaque Rough Broken Land Complex
- Silver Loam
- Silver-Pojoaque Association, Undulating
- Project Power Alternatives
- Major Transportation Corridors

Corridor Soil Types

SOURCE: 2003 aerial photography, hillshade, and transmission information provided by PNM. City boundaries, roads, land use, hydro, and survey section information provided by the City of Santa Fe. THC boundaries provided by Santa Fe County. Soils information provided by NRCS. Map produced February 17, 2004 by JFSA.

0 0.5 1 2 Miles

SCALE - 1:93,000 or 1" = 7750'

Map 3-1

Summary of Soils Crossed on BLM Lands

Alternatives that are located on BLM lands in areas of soils that have severe wind and/or water erosion hazards are highlighted below.

- **Bluewing gravelly sandy loam (severe water erosion hazard) –** Alternatives A, F, O and S, on BLM lands cross this soil type for up to 1,691 feet.
- **Panky fine sandy loam (moderate to severe water/wind erosion hazard) –** This soil type is traversed by all alternatives on BLM land. Panky fine sandy loam also is traversed by alternatives A and F along the existing NZ line. Alternatives A and F traverse 1,195 feet of this soil type; alternatives O and S cross 4,048 feet of this soil type.
- **Pojoaque-Rough Broken Land complex –** This soil type, which is highly erosive, is traversed by all alternatives on BLM lands for 24,111 feet in the northern project area.

Summary of Soils Crossed on Non-BLM Lands

Alternatives that are located on non-BLM lands in areas of soils that have severe wind and/or water erosion hazards are highlighted below.

- **Bluewing gravelly sandy loam (severe water erosion hazard) –** All alternatives on non-BLM lands cross this soil type for distances up to 3,458 feet, and the Zia North Switching Station is located on this soil type.
- **Panky fine sandy loam (moderate to severe water/wind erosion hazard) –** This soil type is traversed for over 44,000 feet by both the O and S alternatives in the mid-section and southern project areas. Panky fine sandy loam also is traversed by alternatives A and F along the existing NZ line.
- **Pojoaque-Rough Broken Land complex –** This soil type, which is highly erosive, is traversed by the O and S alternatives for over 10,000 feet on non-BLM lands.

3.1.3.2 Environmental Consequences

The overlay of construction footprints for alternatives on soil types resulted in the quantification of these impacts provided for alternatives A, F, O, and S on Table 3-3 through Table 3-6. Impacts documented for each alternative on these tables include quantification of construction footprints for all project facilities for previously disturbed and new disturbance areas on BLM and non-BLM lands. Through GIS processing, acres of impacts to severe erosion potential areas were calculated. Footprint impacts were defined using criteria documented in section 3.1.

Initial disturbance to soils occurred when the existing AN and NZ lines were constructed. As shown on Table 3-3 through Table 3-6, new disturbance to soils would result in areas on both BLM and non-BLM lands from construction at structure locations, pulling sites, access roads and switching stations.

The No Action alternative would result in no change regarding soils. The impacts of alternatives A, F, O, and S associated with erosion at construction areas and at arroyo crossings would be mitigated by implementing plans for erosion and sediment control techniques, and Best Management Practices (BMPs), as described in section 3.1.5.

Soils Impacts on BLM Lands

The assessment of soils focuses on the soil erosion-related impacts due to the construction disturbance of alternatives, based on the water and wind erosion potential of each soil type. Direct impacts to erosive soils include temporary and permanent impacts that might result in loss of topsoil, an increase in area erosion potential, and a decrease in the soil's ability to support vegetation. Temporary impacts are related to initial construction activities such as pulling sites, and permanent impacts relate to construction of new access roads and new switching stations. Indirect impacts to erosive soils might results from the loss of or degradation to area soils that precipitate additional loss of topsoil and biological habitat, as well as effects to water quality and local drainages due to increased sedimentation.

Impacts to soils on BLM lands are quantified on Table 3-3 through Table 3-6 for alternatives A, F, O, and S, respectively. These tables provide acres of disturbance for project facilities that have been previously disturbed and for areas where new disturbance would occur.

Alternatives A and F – For Alternatives A and F there would be 4.2 acres of new disturbance at construction sites for structures, and 16 acres of new disturbance at pulling sites, for a total of 20.2 acres. Project activities on BLM land on Alternatives A and F that would occur in previously disturbed areas total 2.4 acres. An area of 14.7 acres that would be subject to new disturbance during construction on BLM lands has a severe susceptibility to water erosion, and 13.6 acres of previously disturbed area has a severe susceptibility to wind erosion. No new access roads are required for alternatives on BLM lands.

Alternatives O and S – For Alternatives O and S there would be 4.0 acres of new disturbance at construction sites for structures, and 16.3 acres of new disturbance at pulling sites, for a total of 20.3 acres. Project activities on BLM land on Alternatives O and S that would occur in previously disturbed areas total 2.8 acres. An area of 14.8 acres that would be subject to new disturbance during construction on BLM lands has a severe susceptibility to water erosion, and 16.8 acres of area that would be subject to new disturbance has a severe susceptibility to wind erosion. No new access roads are required for alternatives on BLM lands.

Soils Impacts on Entire Alternative

Alternative A – For Alternative A there would be 7.8 acres of new disturbance at construction sites for structures, and 27.2 acres of new disturbance at pulling sites, for a total of 35.0 acres. Project activities for Alternative A that would occur in previously disturbed areas total 2.8 acres. An area of 16.4 acres that would be subject to new disturbance during construction has a severe susceptibility to water erosion, and 19.2 acres of area subject to new disturbance has a severe susceptibility to wind erosion. No new access roads are required for alternatives on BLM lands.

Alternative F - For Alternative F there would be 7.2 acres of new disturbance at construction sites for structures, 25.2 acres of new disturbance at pulling sites, and 1.7 acres of new disturbance at the switching station, for a total of 34.1 acres. Project activities for Alternative F that would occur in previously disturbed areas total 12.3 acres. In areas that would be subject to new disturbance during construction, 14.6 acres have a severe susceptibility to water erosion, and 18.6 acres of areas subject to new disturbance have a severe susceptibility to wind erosion.

Alternative O - For Alternative O there would be 7.4 acres of new disturbance at construction sites for structures, 30 acres of new disturbance at pulling sites, and 7 acres of new disturbance for new access roads, for a total of 44.4 acres. Project activities on non-BLM land on Alternative O that would occur in previously disturbed areas total 22.3 acres. An area of 19.3 acres that would be subject to new disturbance during construction has a severe susceptibility to water erosion, and 27.5 acres of area subject to new disturbance has a severe susceptibility to wind erosion.

Alternative S - For Alternative S there would be 16.7 acres of new disturbance at construction sites for structures, 52.5 acres of new disturbance at pulling sites, 19.1 acres of new disturbance for access roads, and 2.1 acres of new disturbance at the switching station, for a total of 90.4 acres. Project activities on non-BLM land on Alternative S that would occur in previously disturbed areas total 25.3 acres. 23.6 acres of area that would be subject to new disturbance during construction has a severe susceptibility to water erosion, and 46.2 acres of area subject to new disturbance has a severe susceptibility to wind erosion.

Table 3-3. Soil Erosion Impacts for Alternative A

	Entire Alternative Total length: 13.1 miles Miles of new line: 0					**BLM Lands Only** Total length: 6.17 miles Miles of new line: 0			
Project Facilities	**Structures**	**New Access**	**Pulling Sites**	**Switching Stations**	**Total Acres**	**Structures**	**New Access**	**Pulling Sites**	**Total Acres**
Quantities	94	0	14	0		40	0	7	
Construction Disturbance Footprint (in Acres)									
Previously Disturbed Area	4.2	0	6.9	0	11.1	0.8	0	1.6	2.4
New Disturbance Area	7.8	0	27.2	0	35.0	4.1	0	16	20.1
Soils: Severe Water Erosion									
Previously Disturbed Area	1.1	0	1.7	0	2.8	0.7	0	0.8	1.5
New Disturbance Area	3.6	0	12.8	0	16.4	3.6	0	11.1	14.7
Soils: Severe Wind Erosion									
Previously Disturbed Area	2.5	0	4.1	0	6.6	0.7	0	0.8	1.5
New Disturbance Area	5.0	0	14.2	0	19.2	3.4	0	10.2	13.6

Table 3-4. Soil Erosion Impacts for Alternative F

	Entire Alternative Total length: 11 miles Miles of new line: 0					**BLM Lands Only** Total length: 6.17 miles Miles of new line: 0			
Project Facilities	**Structures**	**New Access**	**Pulling Sites**	**Switching Stations**	**Total Acres**	**Structures**	**New Access**	**Pulling Sites**	**Total Acres**
Quantities	79	0	12	1		40	0	7	
Construction Disturbance Footprint (in Acres)									
Previously Disturbed Area	2.9	0	8.9	0.5	12.3	0.8	0	1.6	2.6
New Disturbance Area	7.2	0	25.2	1.7	34.1	4.1	0	16.0	20.1
Soils: Severe Water Erosion									
Previously Disturbed Area	0.7	0	0.8	0	1.5	0.7	0	0.8	1.5
New Disturbance Area	3.5	0	11.1	0	14.6	3.6	0	11.1	14.7
Soils: Severe Wind Erosion									
Previously Disturbed Area	1.3	0	4.5	0.5	6.3	0.7	0	0.8	1.5
New Disturbance Area	4.4	0	12.5	1.7	18.6	3.4	0	10.2	13.6

Table 3-5. Soil Erosion Impacts for Alternative O

	Entire Alternative Total length: 16.9 miles Miles of new line: 6 Miles of distribution rebuild: 2.5					**BLM Lands Only** Total length: 6.7 miles Miles of new line: 0			
Project Facilities	**Structures**	**New Access**	**Pulling Sites**	**Switching Stations**	**Total Acres**	**Structures**	**New Access**	**Pulling Sites**	**Total Acres**
Quantities	114	4.8	24	0		45	0	7.0	
Construction Disturbance Footprint (in Acres)									
Previously Disturbed Area	7.2	0	15.1	0	22.3	0.9	0	1.9	2.8
New Disturbance Area	7.4	7.0	30.0	0	44.4	4.0	0	16.3	20.3
Soils: Severe Water Erosion									
Previously Disturbed Area	1.5	0	2.3	0	3.8	0.7	0	0.8	1.5
New Disturbance Area	4.0	0.9	14.4	0	19.3	3.5	0	11.3	14.8
Soils: Severe Wind Erosion									
Previously Disturbed Area	5.6	0	11.5	0	17.1	0.7	0	1.2	1.9
New Disturbance Area	5.9	2.8	18.8	0	27.5	4	0	12.8	16.8

Table 3-6. Soil Erosion Impacts for Alternative S

	Entire Alternative Total length: 25.1 miles Miles of new line: 13.6					**BLM Lands Only** Total length: 6.7 miles Miles of new line: 0			
Project Facilities	**Structures**	**New Access**	**Pulling Sites**	**Switching Stations**	**Total Acres**	**Structures**	**New Access**	**Pulling Sites**	**Total Acres**
Quantities	179	13.15	40	1		38	0	7	
Construction Disturbance Footprint (in Acres)									
Previously Disturbed Area	6.4	0	18.9	0	25.3	0.9	0	1.9	2.8
New Disturbance Area	16.7	19.1	52.5	2.1	90.4	4.0	0	16.3	20.3
Soils: Severe Water Erosion									
Previously Disturbed Area	1.5	0	2.2	0	3.7	0.7	0	0.8	1.5
New Disturbance Area	4.8	2.3	16.5	0	23.6	3.5	0	11.3	14.8
Soils: Severe Wind Erosion									
Previously Disturbed Area	3.9	0	12.8	0	16.7	0.7	0	1.2	1.9
New Disturbance Area	8.5	6.3	29.2	2.1	46.1	4.0	0	12.8	16.8

3.1.4 Water Resources

3.1.4.1 Affected Environment

Project area drainages include broad floodplains associated with larger waterways and northeast/southeast trending arroyos (present in the eroded foothills) formed in intermittent drainages. Most named and unnamed creeks in the project area are intermittent or ephemeral in nature, providing water resources only seasonally or after storms. No wetlands are located along project alternatives.

Disturbances from grazing animals and off-road vehicles in the general project area have broken up protective soil crusts, and caused a lack of vegetative ground cover in many areas, leading to rill formation, erosion, and gully down cutting. Stormwater is therefore generally laden with sediment in the project area. The project area includes a portion of the Santa Fe River floodplain. The Santa Fe River flows southwest toward Cochiti Lake, a reservoir on the Rio Grande west of the project alternatives. The northern project area has served as a major source of water (Buckman well field) for the Santa Fe area since 1972. These wells tap water at depths from 250 to 1050 feet. Surface water from the Santa Fe River watershed and another well field also provide major portions of the drinking water supply to the city of Santa Fe.

Project area drainages under flood conditions are very often wider than the obvious streambed or arroyo channel under dry conditions. Flood conditions are

considered to occur during a "hundred year storm" which is defined as a major storm event that has a 1 percent chance of happening in any year. In Santa Fe County, this "design storm" would bring anywhere from 2 to 3.7 inches of precipitation in a 24-hour period. This storm event would produce flows in excess of the 100 cubic feet per second threshold in even small arroyos.

Drainages Crossed by Alternatives

Drainages crossed by alternatives are illustrated on Map 3-1, and are listed on Table 3-7.

Table 3-7. Arroyo and River Crossings by Alternative

Alternative	A	F	O	S
# of Crossings	8	6	6	9
Arroyos Crossed	■ No Name Creek ■ Alamo Creek ■ Arroyo Calabasas ■ Arroyo de las Trampas ■ Arroyo Frijoles ■ Arroyo de las Trampas ■ Arroyo de los Chamisos	■ No Name Creek ■ Alamo Creek ■ Arroyo Calabasas ■ Arroyo de las Trampas ■ Arroyo Frijoles ■ Arroyo de las Trampas	■ No Name Creek ■ Alamo Creek ■ Arroyo Calabasas ■ Arroyo Frijoles ■ Arroyo de los Chamisos	■ No Name Creek ■ Alamo Creek ■ Arroyo Calabasas ■ Arroyo Frijoles ■ Arroyo de los Chamisos ■ Arroyo Hondo ■ Cañada del Rancho (2 locations)
Rivers Crossed	Santa Fe River	Santa Fe River	Santa Fe River	Santa Fe River

Drainage Crossings on BLM Lands

Norton Switching Station is located within a drainage floodplain. Alamo Creek and four other unnamed intermittent arroyos are crossed by the alternatives. The Buckman Road aqueduct generally follows Buckman Road, crossing under the alternatives about 1.5 miles south of Norton Switching Station with the Alamo Creek drainage.

Drainage Crossings on Non-BLM Lands

Drainages crossed on non-BLM lands include Arroyo Calabasas, the Santa Fe River, Arroyo de los Frijoles, Arroyo de las Trampas, and Arroyo de las Chamisas.

- Alternatives O and S cross Arroyo Calabasas and the Santa Fe River.
- Alternatives A and F cross Arroyo Calabasas, Arroyo de los Frijoles, Arroyo de las Trampas, and the Santa Fe River.
- Alternative A also crosses Arroyo de las Chamisas just before the line bends 90 degrees east to the existing Zia Switching Station.
- Alternative O crosses Arroyo Calabasas, the Santa Fe River, and Arroyo de los Chamisos.

3.1.4.2 Environmental Consequences

Environmental consequences described in this section cover both BLM and non-BLM lands.

Direct impacts to water resources in the project area include possible short-term introduction of sediment into project area drainages associated with alternative construction in the area of arroyo crossings identified in section 3.1.4, Water Resources. Alternatives requiring new arroyo crossings – especially in association with the construction of new access roads, would have the greatest potential to cause long-term direct impacts associated with increased sedimentation in these areas. Indirect impacts to water resources are associated with permanent direct impacts that might cause downstream sedimentation, changes to drainage channels, and effects to downstream water quality.

The No Action alternative would result in no change in the number of arroyo crossings. Alternatives A and F would cross arroyos and the Santa Fe River at existing transmission line crossings. Of primary concern are the arroyo crossings of new access roads required for alternatives O and S on non-BLM lands. These arroyo crossings would require some level of blading to establish construction access for trucks and large equipment through the area. Mitigation planning and US Army Corps of Engineers 404 permitting requirements described in section 3.1.5 would control the transport of sediment at arroyo crossings, and minimize impacts to water resources. No wetlands or special aquatic sites occur where alternatives cross arroyos and the Santa Fe River.

Although wetland areas (fragmented and previously disturbed pockets) exist along the Santa Fe River in the project area, none of the alternatives would impact wetland areas or would be constructed within the ordinary high-water mark of any of the perennial waterways (the Santa Fe River) in the project area. None of the project alternatives would directly affect waters of the US or wetlands (as defined by Section 404 of the federal Clean Water Act).

3.1.5 Avoidance and Mitigation for Soils and Water Resources

This mitigation is common to all alternatives on both BLM and non-BLM land.

Post-construction cleanup, including contouring and reseeding, would be implemented upon completion of the project. Short-term impacts would occur if soil at pulling sites on BLM land were stockpiled, covered, and returned as the top cover after construction. Earthen material and rocks at pulling sites would be spread out over the right-of-way after construction. Impacts to soil would be limited, because PNM would limit blading to the smallest required area and pulling sites have been selected to maximize the use of level or nearly level locations. In addition, impacts to soils on moderate to high slopes would be mitigated through the implementation of BMPs.

A Stormwater Pollution Prevention Plan (SWPPP) would be prepared and implemented during project construction. The plan would address project construction activities to meet the terms and conditions of the USEPA's Phase II Stormwater Regulations of the National Pollutant Discharge Elimination Program (NPDES) (effective March 10, 2003). Phase II requires construction

projects greater than 1.0 acre to apply for coverage under the National Construction General Permit. The SWPPP would identify BMPs which would generally include the following elements: erosion and sediment controls, final stabilization and long-term stormwater management, and other controls (such as materials handling and spill prevention).

Erosion and sediment controls would be installed prior to or during ground disturbance and maintained until the ground surface is stabilized. Post-construction cleanup, including contouring and reseeding, would be implemented upon completion of the project.

Short-term impacts would occur where soil at pulling sites on BLM land could be stockpiled, covered, and returned as the top cover after construction. Earthen material and rocks at pulling sites would be spread out over the right-of-way after construction. Impacts to soils would be low, because PNM would limit blading to areas where it would be necessary. In addition, impacts to soils on moderate to high slopes would be mitigated through the implementation of BMPs to be identified in the SWPPP.

The contractor would restore arroyo crossings to their original or near original contours and elevations (unless otherwise mitigated under a 404 permit) and any native riparian vegetation to be removed along the banks would be replaced with native vegetation. Because construction would take place during times of no flow or low flow and BMPs would be identified in the SWPPP that would control the transport of sediment at arroyo crossings, impacts would be mitigated through the implementation of BMPs.

3.2 Biological Resources

The following sections provide descriptions of the affected environment for vegetation, wildlife and threatened, endangered, and other special status (TES) species, and the environmental consequences and mitigation for alternatives A, F, O and S. The assessment of biological resources is based on the Biological Evaluation of the PNM Project Power Study Area conducted in 2002 and 2003 (Marron and Associated, Inc. January 2003 and January 2004), which is on file at the Taos BLM Office; and classified vegetation mapping (Santa Fe County and New Mexico Natural Heritage Program 1998).

3.2.1 Vegetation

3.2.1.1 Affected Environment

Biological surveys were conducted in the project area during July, August, November, and December of 2002, and during January of 2004 (Marron and Associates Inc. 2003 and 2004). One hundred and two species of vascular plants representing 38 families were observed in the project area during the surveys. The vegetation had been severely stressed by the drought of 2002, which reduced the cover and frequency of herbaceous and woody plants in the area. During more favorable conditions the number of plant species could be expected to double within the project area. Observed plants in the project area were not rare or unusual and all were typical of habitat types encountered in the project area.

Map 3-2 displays the distribution of the major vegetation designations present in the project area. The primary vegetation communities in the project area are Arroyo Riparian/Floodplain Scrubland, Piñon-Juniper Woodland, Juniper Savanna (which has a smaller density of trees than a woodland), and Plains-Mesa Grasslands interspersed among wooded areas. In larger, open areas, Arroyo Riparian/Floodplain Scrubland vegetation exists along the ephemeral waterways (arroyos) and a band of Montane Riparian vegetation exists along the Santa Fe River. There are residential areas within the project study area that are nearly wholly dominated by weedy species.

Table 3-8 provides a summary of the terrain and dominant and common species associated with each of the primary vegetation types along the alternative corridors.

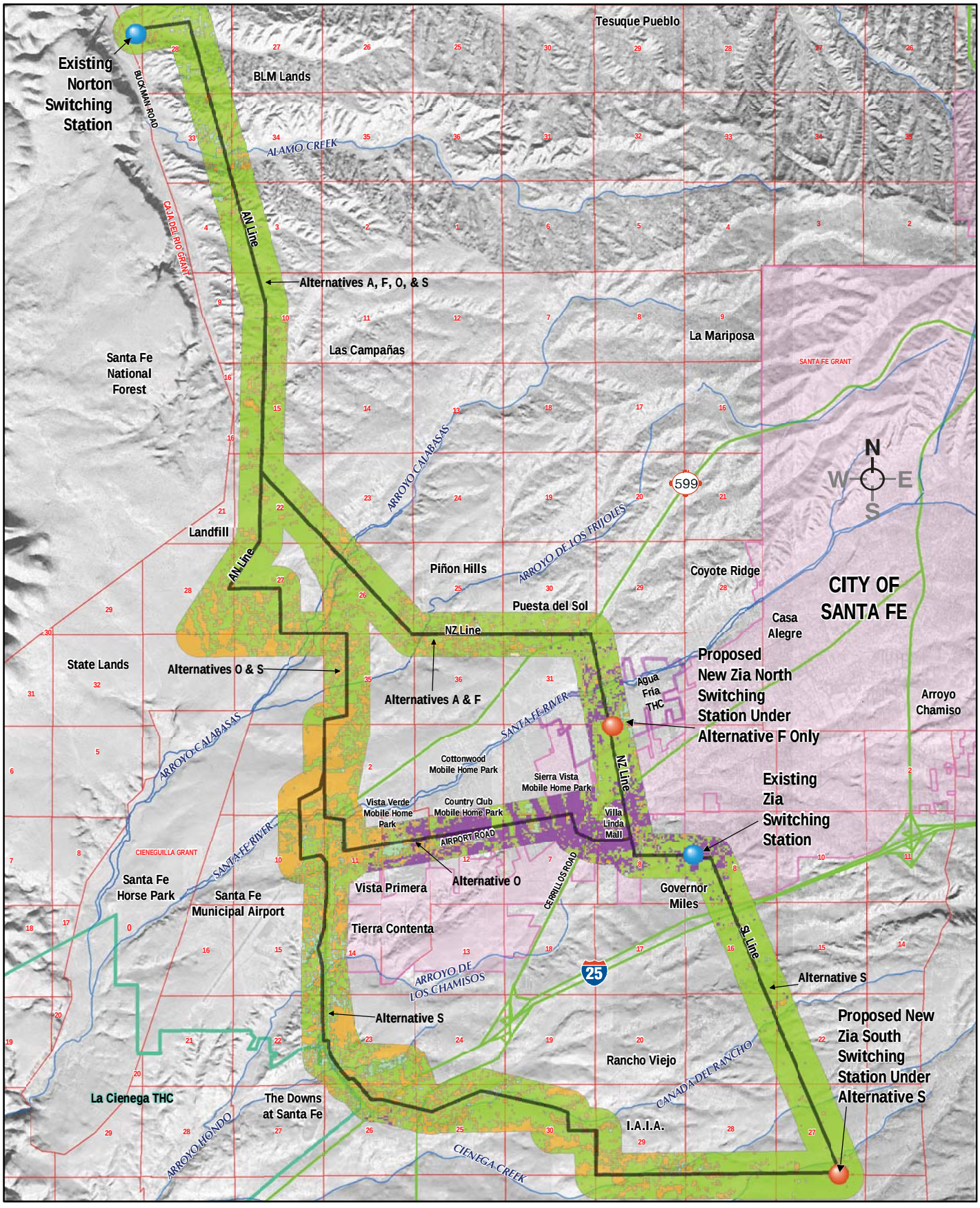
Table 3-8. Vegetation Types in Santa Fe Area

Vegetation Types	Terrain	Dominant and Common Species*
Piñon-Juniper Woodland	7,000 to 9,000 feet or lower elevations in protected canyons	Piñon pine (*Pinus edulis*), single-seeded juniper (*Juniperus monosperma*); Gambel oak (*Quercus gambeli*), hedgehog cactus (*Echinocereus triglochidiatus*), lemonade berry (*Rhus trilobata*), mountain mahogany (*Cerocarpus montanus*)
Juniper Savanna	Tree density < 130 trees per acre; includes grassy areas as well as areas of sparse ground cover	Single-seeded juniper (*Juniperus monosperma*), grama grasses (*Bouteloua sp.*)
Plains-Mesa Grassland	Covers most of the eastern plains up to the foothills and slopes of Sangre de Cristo Mountains; includes Mid-Grass Prairie and Short-Grass Prairie classifications; *[Note: this classification includes areas transitioning into Scrubland]*	Side-oats grama (*Bouteloua curtipendula*), blue grama (*Bouteloua gracilis*), winter fat (*Ceratodies lanata*), four-wing salt bush (*Atriplex Canescens*), chamisa ricegrass (*Oryzopsis hymenoidies*), broom snakeweed (*Xanthocephalum sarothrae*), Russian thistle (*Salsola kali*), cholla (*Opuntia imbricata*), prickly pear (*Opuntia polyaccanta*), yucca (*yucca glauca*, *yucca baccata*); bigelow sagebrush (*Artemisia begelovii*), big sagebrush (*Artemisia tridentate*), scrub oak (*Quercus turbinella*), wavyleaf oak (*Quercus undulata*), and mountain mahogany (*Cercocarpus montanus*)
Arroyo Riparian / Floodplain Scrubland	Sandy, cobbly, or rocky arroyo bottom – often devoid of perennial vegetation; patches of ephemeral herbaceous vegetation; includes scrub semi-riparian vegetation along arroyo slopes	Single-seeded juniper (*Juniperus monosperma)*, rabbitbrush (*Chrysothamnus nauseosus*), fourwing saltbrush (*Artemisia bigelovii*), other shrubs, and various grasses and herbs
Montane Riparian	Perennial drainages (Santa Fe River riparian vegetation)	Willows (*Salix sp.*), Russian-olive (*Elaeagnus angustifolia*), rabbitbrush (*Chrysothamnus nauseosus*), and mints, weedy species.
Mesic Rural / Residential	Mixed trees and irrigated grasses	Mixed species including weedy species

Table 3-9 provides quantification of the distance of each vegetation type crossed by alternatives on BLM lands and non-BLM lands.

Table 3-9. Vegetation Types Traversed by Alternatives (linear feet)

Alternative	A		F		O		S	
Vegetation Type	BLM	Non-BLM	BLM	Non-BLM	BLM	Non-BLM	BLM	Non-BLM
Piñon-Juniper Woodlands	0	748	0	561	0	187	0	0
Juniper Savanna	28,675	28,020	28,675	20,272	28,620	20,668	28,620	64,844
Plains-Mesa Grassland	3,037	4,582	3,037	4,280	2,768	15,009	2,768	25,355
Arroyo Riparian / Floodplain Scrubland	845	410	845	410	845	861	845	4,086
Montane Riparian	0	696	0	564	0	225	0	468



LEGEND

- Existing PNM Switching Station Utilized in Alternative
- Proposed Switching Station
- Arroyo Riparian / Floodplain Scrubland
- Juniper Savanna
- Piñon Juniper Woodland
- Plains-Mesa Grassland
- Rural & Urban Development
- Project Power Alternatives
- Major Transportation Corridors

0 0.5 1 2 Miles

SCALE - 1:93,000 or 1" = 7750'

Corridor Vegetation

SOURCE: 2003 aerial photography, hillshade, and transmission information provided by PNM. City boundaries, roads, hydro, and survey information provided by the City of Santa Fe. THC boundaries provided by Santa Fe County. Vegetation information provided by the New Mexico Natural Heritage Program. Map produced February 17, 2004 by JFSA.

Map 3-2

Vegetation Types Traversed on BLM Lands

The following is a summary distribution of vegetation types traversed by the alternatives on BLM lands.

- Juniper Savanna vegetation is by far the primary vegetation type traversed by all alternatives on BLM lands.
- Plains-Mesa Grassland vegetation is the next dominant vegetation type on BLM lands.
- Montane Riparian vegetation is not present on BLM lands.
- Piñon-Juniper Woodland is not present on BLM lands.
- Intense livestock grazing has moved succession in the Plains-Mesa Grassland community toward Scrublands (areas mapped as interior scrublands by the NM Natural Heritage Program are included in the Plains-Mesa Grassland vegetation designation).

Vegetation Types Traversed on Non-BLM Lands

The following is a summary distribution of vegetation types traversed by the alternatives on non-BLM lands.

- Juniper Savanna vegetation is by far the primary vegetation type traversed by all alternatives and is particularly dominant in the northern project area along the AN line and the southeastern project area along the SL line.
- Plains-Mesa Grassland vegetation is the next dominant vegetation type over the project area and is most dominant in the midwestern and southwestern project areas (O and S alternative alignments).
- Montane Riparian vegetation is present near the Santa Fe River.
- Rural and urban development disturbance is predominant along Airport Road (Alternative O alignment).
- Much of the Piñon-Juniper Woodland community within the project area has suffered from the recent drought. As a result of the drought, bark beetle infestations have occurred throughout much of northern New Mexico and large numbers of piñon trees have died in the project area.
- Intense livestock grazing has moved succession in the Plains-Mesa Grassland community toward Scrublands (areas mapped as interior scrublands by the NM Natural Heritage Program are included in the Plains-Mesa Grassland vegetation designation).

3.2.1.2 Environmental Consequences – Vegetation

For the No Action alternative, there would be no change to vegetation, wildlife, or TES species.

Impacts to vegetation are evaluated based on vegetation mapping provided by the New Mexico Natural Heritage Program (1998). Alternative footprints (as defined in Chapter 2) were used to overlay the digital vegetation mapping data and determine acreage impacts. Impacts are shown in Table 3-10 through Table 3-13.

Vegetation Impacts on BLM Lands

Impacts on vegetation to BLM lands are quantified on Table 3-10 through Table 3-13 for alternatives A, F, O, and S, respectively. These tables provide acres of disturbance for project facilities that have been previously disturbed and for areas where new disturbance would occur.

Alternatives A and F – For alternatives A and F there would be 4.2 acres of new disturbance at construction sites for structures, and 16 acres of new disturbance at pulling sites for a total of 20.2 acres. Project activities on BLM land on alternatives A and F that would occur in previously disturbed areas total 2.4 acres. A total of 22.6 acres of vegetation would be disturbed during construction on BLM lands. No new access roads are requirements for alternatives on BLM lands.

Alternatives O and S – For alternatives O and S there would be 4 acres of new disturbance at construction sites for structures, and 16.3 acres of new disturbance at pulling sites for a total of 20.3 acres. Project activities on BLM land on alternatives O and S that would occur in previously disturbed areas total 2.8 acres. An area of 14.8 acres that would be subject to new disturbance during construction on BLM lands has a severe susceptibility to water erosion, and an area of 16.8 acres that would be subject to new disturbance has a severe susceptibility to wind erosion. No new access roads are requirements for alternatives on BLM lands.

Vegetation Impacts of Entire Alternatives

Project alternatives would affect areas of native vegetation due to line, station and access road construction activities. Improvement of access roads is likely to result in the disturbance of vegetation along the edges of the roadways. The work around the structures would also temporarily disturb native vegetation that currently surrounds the structure sites. Since most of the areas around the structures are clear of large perennial vegetation, raising the structures in most cases would affect primarily grasses and herbs. Even though soft-tired vehicles would be utilized for construction, these vehicles are likely to crush some of the local vegetation.

The A and F alternatives (structure sites) are the only alternatives indicated to disturb Piñon-Juniper Woodland vegetation (associated with NZ line activities on non-BLM land). The greatest impacts (over 12 acres) to Juniper Savanna vegetation are associated with Alternative S. The SL line portion and new line construction of Alternative S are associated with 7 acres of these impacts. Alternative O is associated with almost 6 acres of impacts to Juniper Savanna vegetation – about 2 acres more than alternatives A and F. Alternative S is associated with the greatest impacts to Plains-Mesa Grassland and Arroyo Riparian/Floodplain Scrubland vegetation. Alternative S (new line construction location) is the only alternative to disturb Montane Riparian vegetation along the Santa Fe River.

Juniper Savanna is the most highly impacted vegetation type. Over 24 acres of impacts to Juniper Savanna are indicated for Alternative S on non-BLM lands.

Permanent impacts to vegetation from required access roads for alternatives O and S are shown in Table 3-12 and Table 3-13. Alternative S is indicated to have 6.3 and 4 acres of impacts to previously undisturbed areas of Juniper Savanna and Plains-Mesa Grassland vegetation, respectively.

The following tables indicate the number of acres affected, by type of vegetation, for each alternative. These potential impacts are divided by type of facility: structure sites, access roads, pulling sites, and switching stations. The types of potential impacts to vegetation for each of these facilities are as follows:

- **Structure sites:** (75 x 75 foot areas) clearing of trees or shrubs that interfere with removal or rebuild of structures, crushing of grasses by construction equipment.

- **Access roads:** (12 feet across) clearing of vegetation for new roads (only as much as necessary), disturbance of vegetation on edge of roads for existing access roads (crushing, clearing for regrading).

- **Pulling sites:** (200 x 300 feet areas) crushing of grasses by pulling equipment, potential clearing of trees.

- **New switching stations:** (260 x 360 feet areas) permanent clearing of vegetation from site.

Table 3-10. Vegetation Impacts for Alternative A

	Entire Alternative Total length: 13.1 miles Miles of new line: 0					**BLM Lands Only** Total length: 6.17 miles Miles of new line: 0			
Project Facilities	**Structures**	**New Access**	**Pulling Sites**	**Switching Stations**	**Total Acres**	**Structures**	**New Access**	**Pulling Sites**	**Total Acres**
Quantities	94	0	14	0		40	0	7	
Construction Disturbance Footprint (in Acres)									
Previously Disturbed Area	4.2	0	6.9	0	11.1	0.8	0	1.6	2.4
New Disturbance Area	7.8	0	27.2	0	35.0	4.2	0	16	20.2
Piñon-Juniper Woodland									
Previously Disturbed Area	0	0	0	0	0	0	0	0	0
New Disturbance Area	0.1	0	0.2	0	0.3	0	0	0	0
Juniper Savanna									
Previously Disturbed Area	3.3	0	5.8	0	9.1	0.8	0	1.4	2.2
New Disturbance Area	6.7	0	22.8	0	29.5	3.8	0	14.0	17.8
Plains-Mesa Grassland									
Previously Disturbed Area	0.4	0	0.4	0	0.8	0.1	0	0.1	0.2
New Disturbance Area	0.8	0	2.4	0	3.2	0.3	0	1.3	1.6
Arroyo Riparian/ Scrubland									
Previously Disturbed Area	0	0	0.1	0	0.1	0	0	0.1	0.1
New Disturbance Area	0	0	0.8	0	0.8	0	0	0.7	0.7
Montane Riparian									
Previously Disturbed Area	0	0	0.1	0	0.1	0	0	0	0
New Disturbance Area	0	0	.5	0	.5	0	0	0	0
Total Vegetation Acres					**44.4**				**22.6**

Table 3-11. Vegetation Impacts for Alternative F

	Entire Alternative Total length: 11 miles Miles of new line: 0					**BLM Lands Only** Total length: 6.17 miles Miles of new line: 0			
Project Facilities	**Structures**	**New Access**	**Pulling Sites**	**Switching Stations**	**Total Acres**	**Structures**	**New Access**	**Pulling Sites**	**Total Acres**
Quantities	79	0	12	1		40	0	7	
Construction Disturbance Footprint (in Acres)									
Previously Disturbed Area	2.9	0	8.9	0.5	12.3	0.8	0	1.6	2.6
New Disturbance Area	7.2	0	25.2	1.7	34.1	4.1	0	16.0	20.1
Piñon-Juniper Woodland									
Previously Disturbed Area	0	0	0	0	0	0	0	0	0
New Disturbance Area	0.1	0	0	0	0.1	0	0	0	0
Juniper Savanna									
Previously Disturbed Area	2.5	0	8.1	.5	11.1	0.8	0	1.4	2.2
New Disturbance Area	6.2	0	22.3	1.6	30.1	3.8	0	14.0	17.8
Plains-Mesa Grassland									
Previously Disturbed Area	0.4	0	0.4	0	0.8	0.1	0	0.1	0.2
New Disturbance Area	0.8	0	2.4	0.1	3.3	0.3	0	1.3	1.6
Arroyo Riparian/ Scrubland									
Previously Disturbed Area	0	0	0.1	0	0.1	0	0	0.1	0.1
New Disturbance Area	0	0	0.7	0	0.7	0	0	0.7	0.7
Montane Riparian									
Previously Disturbed Area	0	0	0	0	0	0	0	0	0
New Disturbance Area	0	0	0	0	0	0	0	0	0
Total Vegetation Acres					**46.2**				**22.6**

Table 3-12. Vegetation Impacts for Alternative O

	Entire Alternative Total length: 16.9 miles Miles of new line: 6 Miles of distribution rebuild: 2.5					**BLM Lands Only** Total length: 6.7 miles Miles of new line: 0			
Project Facilities	**Structures**	**New Access**	**Pulling Sites**	**Switching Stations**	**Total Acres**	**Structures**	**New Access**	**Pulling Sites**	**Total Acres**
Quantities	114	4.8 miles	24	0		45	0	7	
Construction Disturbance Footprint (in Acres)									
Previously Disturbed Area	7.2	0	15.1	0	22.3	0.9	0	1.9	2.8
New Disturbance Area	7.4	7.0	30.0	0	44.4	4.0	0	16.3	20.3
Piñon-Juniper Woodland									
Previously Disturbed Area	0	0	0	0	0	0	0	0	0
New Disturbance Area	0	0	0.2	0	0.2	0	0	0	0
Juniper Savanna									
Previously Disturbed Area	3.2	1.0	6.3	0	10.5	0.8	0	1.8	2.6
New Disturbance Area	5.8	1.6	21.3	0	28.7	3.8	0	14.7	18.5
Plains-Mesa Grassland									
Previously Disturbed Area	1.8	1.2	3.6	0	6.6	0.1	0	0.4	0.5
New Disturbance Area	1.5	1.2	5.8	0	8.5	0.7	0	3.6	4.3
Arroyo Riparian/ Scrubland									
Previously Disturbed Area	0.1	0	0.1	0	0.2	0	0	0.1	0.1
New Disturbance Area	0	0	0.7	0	0.7	0	0	0.7	0.7
Montane Riparian									
Previously Disturbed Area	0	0	0.1	0	0.1	0	0	0	0
New Disturbance Area	0	0	0.5	0	0.5	0	0	0	0
Total Vegetation Acres					**56.0**				**26.7**

Table 3-13. Vegetation Impacts for Alternative S

	Entire Alternative Total length: 25.1 miles Miles of new line: 13.6					BLM Lands Only Total length: 6.7 miles Miles of new line: 0			
Project Facilities	**Structures**	**New Access**	**Pulling Sites**	**Switching Stations**	**Total Acres**	**Structures**	**New Access**	**Pulling Sites**	**Total Acres**
Quantities	179	13.15 miles	40	1		38	0	7	
Construction Disturbance Footprint (in Acres)									
Previously Disturbed Area	6.4	0	18.9	0	25.3	0.9	0	1.9	2.8
New Disturbance Area	16.7	19.1	52.5	2.1	90.4	4.0	0	16.3	20.3
Piñon-Juniper Woodland									
Previously Disturbed Area	0	0	0	0	0	0	0	0	0
New Disturbance Area	0	0	0	0	0	0	0	0	0
Juniper Savanna									
Previously Disturbed Area	4.0	6.3	9.6	0	19.9	0.8	0	1.8	2.6
New Disturbance Area	12.8	3.2	38.9	2.0	56.9	3.8	0	14.7	18.5
Plains-Mesa Grassland									
Previously Disturbed Area	2.0	4.0	8.7	0	14.7	0.1	0	0.4	0.5
New Disturbance Area	3.0	2.3	10.6	0.2	16.1	0.7	0	3.6	4.3
Arroyo Riparian/ Scrubland									
Previously Disturbed Area	0.3	0	0.3	0	0.6	0	0	0.1	0.1
New Disturbance Area	0.6	0	2.3	0	2.9	0	0	0.7	0.7
Montane Riparian									
Previously Disturbed Area	0	2.3	0	0	2.3	0	0	0	0
New Disturbance Area	0.2	0	0	0	0.2	0	0	0	0
Total Vegetation Acres					**113.6**				**26.7**

3.2.1.3 Noxious Weeds Impacts on BLM and Non-BLM Lands

The only noxious weed species observed in the study area were Class C species such as Russian olive, Siberian elm, saltcedar, and bindweed. None of the proposed actions are anticipated to dramatically affect the spread of any of these species.

3.2.1.4 Avoidance and Mitigation – Vegetation

The Santa Fe County Terrain Management requirements include landscaping specifications to be included in the Terrain Management Plan submittal. Landscaping requirements generally include preservation of significant native

trees, shrubs and other vegetation wherever possible, revegetation of disturbed areas, and screening of developed areas/structures.

Heavy equipment and pulling sites would be reseeded upon completion of the project if their use results in the removal of a significant amount of vegetation. The seed mixtures would be composed of native grasses, herbs and shrubs found in the project area. The specific seed mixture would be developed in cooperation with the landowners and land management agencies (including BLM and the City of Santa Fe). Upon completion of the project, it is anticipated that the seeded locations would develop into open grassy areas.

3.2.1.5 Avoidance and Mitigation – Noxious Weeds

Alternative construction could provide the opportunity for the spread of noxious weeds. To prevent this, all equipment utilized during construction would be washed prior to entering the project area. Seed mixtures used in revegetation of disturbed areas would be certified weed-free. Any fill mixture brought into BLM land would be from a weed-free source. The selected site would be inspected for noxious weeds and weed control to minimize reproduction and movement of noxious weeds to other areas. PNM and BLM would monitor the site for noxious weed infestation, and PNM would provide for treatment of noxious weeds. All heavy equipment on BLM land would be required to be cleansed of mud and dirt prior to entering and exiting public lands to remove noxious weed seeds.

3.2.2 Wildlife

3.2.2.1 Affected Environment – Wildlife

This section provides a regional overview of the approximately 357 species of wildlife that are known or expected to occur in the general area within and adjacent to the Española Basin. This includes BLM lands and non-BLM lands. These species include at least 48 species of reptiles and amphibians, 61 species of mammals, and 248 species of birds. Many of these species are migratory and are in the area only part of the year. Bird densities are likely to be greatest along the edges of habitats, with the greatest bird density and diversity noted along the riparian zone. During the course of this study, 45 vertebrate species were either directly observed or noted by indirect indicators (such as tracks) within the project area. These include 34 species of birds, eight species of mammals, and three reptile species. The majority of birds expected in the area are migratory and will only be present in the project area during spring and summer seasons.

3.2.2.2 Environmental Consequences – Wildlife Impacts on BLM and Non-BLM Lands

During the course of this study, 45 vertebrate species were either directly observed or noted by indirect indicators (such as tracks) within the project area. These include 34 species of birds, eight species of mammals, and three reptile species. The majority of birds expected in the area are migratory and would only be present in the project area during spring and summer seasons.

The construction of all alternatives would temporarily affect wildlife habitat in construction areas. The improvement of access roads would likely affect habitat along the edges of the roads. Raising the structures would create a temporary

surface disturbance around the structures, and in some areas, the pulling sites are likely to convert patches of Piñon-Juniper Woodland and Juniper Savanna habitat into grassland habitat. These surface disturbances and conversion of habitat would likely affect small mammals and reptiles in the area, causing temporary displacement and in some cases potential loss or conversion of small amounts of habitat. Open trenches and ditches can trap small mammals, amphibians, and reptiles and can injure large mammals. Construction of new access roads (associated with the O and S alternatives) would have the greatest permanent impacts to wildlife habitat.

If construction occurs during fall or winter months (outside the nesting season), the overall effect on wildlife should be brief and minimal. However, if construction occurs during spring or early summer, then there is a potential for disruption of activities of birds in the project area. Noise and activity of construction through large tracts or remote wildlife habitat could result in potential abandonment or disruption of nesting activities for birds. Any construction activities in close proximity to the Santa Fe River might cause the accidental discharge of fuel or lubricants along the river and could adversely affect fish and other aquatic species in the river.

3.2.2.3 Avoidance and Mitigation – Wildlife

Wildlife impacts include direct disturbance and destruction of habitat, as well as indirect disturbance based on proximity to access roads and construction activities. Several measures have been recommended by the New Mexico Department of Game and Fish (NMDGF) to minimize impacts to wildlife from trenching. These include: keeping trenching and back-filling crews close together; completing the trenching during the cooler months when wildlife are less active; avoiding trenching in wetland or riparian areas; providing escape ramps if trenches are left open overnight; and inspecting and removing trapped animals from open trenches.

Prior to any construction during the spring or summer, a detailed survey of the selected alternative area would be completed to ensure that migratory bird nest sites would not be impacted by the project.

In order to avoid any impact to water quality (in the Santa Fe River), which could aversely affect aquatic wildlife, the following measures are recommended:

- Confine refueling of all construction vehicles to outside of the floodplain of the river.
- Inspect all vehicles before the onset of construction to ensure that there are no fuel or hydrologic leaks.
- Clean all vehicles before they enter the river to remove any contaminants that might be on the vehicle surface.
- If construction activity approaches the edge of the river, install filter fences to contain any erosion.

With the implementation of these measures there should be no adverse effect upon the aquatic biology within the project area. There are no anticipated impacts on the Santa Fe River or other perennial waterways in the area. If construction

occurs near the Santa Fe River, measures to prevent the potential of release of contaminants or toxic materials into these waterways would be implemented.

3.2.3 Threatened, Endangered, and Other Special Status (TES) Species

3.2.3.1 Affected Environment – TES Species

A variety of biological surveys were conducted throughout July, August, November, and December of 2002, and in January 2004. These included surveys of the project area for rare or protected species such as the Santa Fe cholla and the gray vireo, as well as more general surveys to document types of plant communities, wildlife habitat, plant and animal species, and wetlands in the project area. References and databases containing information on biological resources in the project area were reviewed prior to the survey. The surveys were conducted along portions of the existing AN and NZ transmission lines within the project area, as well as access roads, pulling site locations, and facility locations that had been identified. In addition to targeted surveys, general surveys recorded vegetation, prairie dog colonies, wetlands, and other biological features.

Suitable habitat for the gray vireo exists along approximately 13 miles of the AN and NZ lines. Surveys were conducted for this species by playing a taped call of the gray vireo in all potential habitat from within the right-of-way to approximately 150 feet outside the right-of-way. The taped call was played for 20 seconds every minute for five minutes at locations every 0.3 mile. All appropriate habitat was surveyed between 8:20 a.m. and 3:15 p.m. during July. General data were also collected on raptors and passerine bird species during the surveys.

A 100 percent-coverage survey for Santa Fe cholla (*Opuntia viridiflora*) was performed along access roads, structure pads, and the proposed pulling site locations. The survey parameters included a 50-foot-wide area of coverage centered from the center of all access roads and a 200-foot wide area for the length of the line. The surveys were conducted during August 2002.

Target species were determined through a review of BISON-M database (NMDGF, 2002), New Mexico Rare Plant Technical Council (NMRPTC, 2001), and data provided by the U.S. Fish and Wildlife Service (USFWS, 1998) and the BLM. Fifty-six species of plants and animals with agency status could occur in Santa Fe or Rio Arriba counties. This includes 43 animal species and 13 plant species. After detailed analysis, 14 animal species and 10 plant species were removed from further consideration because they either had no appropriate habitat within the project area or the species was not expected in the project area.

3.2.3.2 TES Animal Species

Thirty-one species or varieties of animals with agency status could potentially occur within the project area. This includes 16 bird species or varieties, 10 mammal species, and 5 species of fish. One of these species, Gunnison's prairie dog, does not currently have a threatened or endangered status, nor is it considered a candidate or a species of concern. However, the City of Santa Fe protects prairie dogs, and some populations found in the project area may occur within the limits of the City of Santa Fe. Table 3-14 lists animal species with

agency status that could potentially occur in the project area. Protocol surveys were initiated for the gray vireo. Three of these animal species, the gray vireo, loggerhead shrike, and western burrowing owl, were found near the project area.

Table 3-14. Threatened, Endangered, and Other Special Status Animal Species Potentially Occurring in the Project Area

Animal Species	Federal Status	State/ City Status	Present/ Absent	
			BLM	Non-BLM
Birds				
Athene cunicularia hypugea (Western burrowing owl)	BLMS		A	A
Ammodramus bairdii (Baird's sparrow)	SC, BLMS	T	A	A
Buteo regalis (ferruginous hawk)	BLMS		A	A
Charadrius montanus (mountain plover)	PT	T	A	A
Chlidonias niger (black tern)	SC, BLMS		A	A
Coccyzus americanus (yellow-billed cuckoo)	C		A	A
Empidonax traillii extimus (southwestern willow flycatcher)	E	E	A	A
Falco peregrinus anatum and *tundrius* (American and Arctic peregrine falcons)	SC	T	A	A
Grus americana (whooping crane)	E***	E	A	A
Haliaeetus leucocephalus (bald eagle)	T	T	A**	A
Lanius ludovicianus (loggerhead shrike)	BLMS		P	A
Plegadis chihi (white-faced ibis)	BLMS		A	A
Sterna antillarum (interior least tern)	E		A	A
Vireo vicinior (gray vireo)		T	P	P
Mammals				
Corynorhinus townsendii (Townsend's big-eared bat)	SC		A	A
Cynomys gunnisoni (Gunnison's prairie dog)		COS	A	P
Euderma maculatum (spotted bat)	BLMS		A	A
Mustela nigripes (black-footed ferret) E A	E		A	A
Myotis cilolabrum melanorhinus (small-footed myotis bat)	BLMS		A	A

Animal Species	Federal Status	State/ City Status	Present/ Absent	
			BLM	Non-BLM
Myotis evotis (long-eared myotis bat)	BLMS		A	A
Myotis thysanodes thysanodes (fringed myotis bat)	BLMS		A	A
Myotis yumanensis yumanensis (Yuma myotis bat)	BLMS		A	A
Myotis volans interior (long-legged myotis bat)	BLMS		A	A
Zapus hudsonius luteus (New Mexican meadow jumping mouse)	SC		A	A
Fish				
Catostomus plebeius (Rio Grande sucker)	SC		A*	A
Gila robusta (roundtail chub)	SC, BLMS		A*	A
Hybognathus amarus (Rio Grande silvery minnow)	E	E	A*	A
Oncorhynchus clarki virginalis (Rio Grande cutthroat trout)	SC		A*	A
Playgobio (Hybopsis) gracilis (flathead chub)	BLMS		A*	A

A - absent during the project survey, C - candidate, E - endangered, PT - proposed threatened, SC - species of concern, T - threatened, S - sensitive, BLMS-BLM Sensitive,*previously reported data,** may be present during other seasons but not during the survey,***experimental population

TES Species Known to Occur on BLM Lands

The loggerhead shrike is indicated to be present based one observation of the bird (near structure locations NZ47 and NZ48, on the A and F alternative alignments) during summer 2002 surveys. The loggerhead shrike is a small gray bird with a black facial mask, black wings and tail, and a heavy hooked bill. The species nests in shrubs, hedgerows, and trees and often uses the same nest year after year.

There is suitable habitat for the gray vireo along the AN line (all alternative alignments) and the NZ line (A and F alternative alignments) traversing BLM lands. This area consists of scattered one-seeded juniper and associated desert grassland with rolling hills. Three gray vireos were observed in the project area during biological surveys on BLM lands. The gray vireo is a small, drab gray bird with a faint single wing bar and faint spectacles around the eyes. The breeding habitat of the species is open woodlands/shrublands with junipers as the dominant element in most areas of occurrence.

TES Species Known to Occur on Non-BLM Lands

There is suitable habitat for the gray vireo along the AN line (all alternative alignments) and the NZ line (A and F alternative alignments). This area consists of scattered one-seeded juniper and associated desert grassland with rolling hills. The breeding habitat of the species is open woodlands/shrublands with junipers as the dominant element in most areas of occurrence. Suitable habitat for the gray

vireo is also present along new line footprints of the O and S alternatives. Potential habitat for the gray vireo was found in three locations in the Alternative S project area during biological surveys in January 2004. Two sites were located about 650 feet west of the Alternative S alignment (and would not be affected by the project), and one was located along the SL line. However, formal biological surveys were not performed for the O and S alignments.

Gunnison's prairie dogs live in shortgrass and midgrass prairies and grass-shrub habitats. They are generally inactive during the winter, but can appear above ground on warm days even in the winter months. One prairie dog colony was observed along the NZ line (Alternative A only) within the Agua Fria community. Numerous prairie dog colonies are present along Airport Road (associated with the Alternative O alignment).

The burrowing owl is a medium-sized, sandy-colored owl with long legs. The species is active by day and by night. The burrowing owl nests in abandoned rodent burrows (commonly prairie dog burrows), modifying these burrows by digging and scraping with the beak, wings, and feet. A solitary burrow containing indications of burrowing owl use was discovered a mile west of the NZ line (west of the alternative A and F alignments). Kangaroo rat mounds (a possible habitat for burrowing owls) were observed along the Alternative S alignment.

3.2.3.3 TES Plant Species

Three plant species with agency status (Table 3-15) could potentially occur in the project area common to BLM and non-BLM lands; however, none were observed during biological surveys (summer and fall of 2002).

Table 3-15. Threatened, Endangered, and Other Special Status Plant Species Potentially Occurring in the Project Area

Plant Species	Federal Status	State/ City Status	Present/ Absent	
			BLM	Non-BLM
Astragalus feensis (Santa Fe milkvetch)		SC	A	A
Astragalus puniceus var. gertrudis (Taos milkvetch)		SC	A	A
Opuntia viridiflora (Santa Fe cholla)	SOC	E	A	A

A - absent during the project survey, C - candidate, E - endangered, PT - proposed threatened, SC - species of concern, T - threatened, S - sensitive, BLMS-BLM Sensitive

The Santa Fe milkvetch grows on sandy benches and gravelly hillsides within Pinon-Juniper Woodland or Plains-Mesa Grasslands. It could be expected to occur throughout much of the project area but none was found during the 2002 surveys (summer and fall of 2002).

Most of the wooded portions of the northern portion of the AN line could be considered potential habitat for the Taos milkvetch; however, the project area is outside the known range for this species and is generally slightly lower in

elevation than habitats where it has been found in the past. It was not found during the 2002 surveys.

The Santa Fe cholla cactus has recently been found to exist at a number of locations in Santa Fe County. The species habitat is gravelly rolling hills in Piñon-Juniper Woodland vegetation. The species has been impacted by urban development and sprawl. Although habitat for the species exists in the project area on BLM and non-BLM lands, no Santa Fe cholla was observed during biological surveys.

3.2.3.4 Migratory Birds and Raptors

The following applies to both BLM lands and non-BLM lands in the project area. Migratory birds are protected by the Migratory Bird Treaty Act (16 USC 703-7111). Individual birds, their nests, and eggs are protected under the act. No passerine nests occurred within the proposed construction limits. Nor were there any raptor nest sites within or adjacent to the project limits. The available survey results are being utilized for assessment purposes in this EA. However, surveys for migratory bird nests conducted during 2002 were applicable only through February 2003. After that time a new nesting season began and it is possible that nest sites could be established anywhere along the transmission lines. If the proposed construction activities are to occur during the spring or summer, a new survey should be performed prior to construction.

3.2.3.5 Environmental Consequences – TES Species

There were no federal threatened, endangered, proposed, or candidate species present in the project area based on the biological surveys conducted. However, there were three species with state or local status in the project area. These were the gray vireo, loggerhead shrike, and Gunnison's prairie dog. Signs of a fourth species – the western burrowing owl – were found near the project area. Gray vireo is a state endangered species; loggerhead shrike is a BLM sensitive species, and Gunnison's prairie dog is regulated by the City of Santa Fe (within the city limits). Burrowing owl is a BLM sensitive species and US Fish and Wildlife Service species of concern. Table 3-16 provides a summary of the alternatives' potential impacts to these species.

Table 3-16. Potential Impacts to Species with Agency Status

Species / Resource	A	F	O	S
Gray vireo	Potential impacts to nest areas along the AN line on BLM and Non-BLM lands			
Loggerhead shrike	Potential impacts to nest areas along the NZ line on BLM lands		None indicated	None indicated
Gunnison's prairie dog	Potential impacts to a colony in Agua Fria area on non-BLM lands		Potential impact to numerous colonies along Airport Road, on Non-BLM lands.	None indicated
Burrowing owl	None indicated	None indicated	Potential impacts in areas of prairie dog colonies along Airport Road, on non-BLM lands	Potential impacts in areas of kangaroo rat mounds along SL line, on non-BLM lands
Raptor and passerine nests	Potential impacts to nest sites throughout the project area, on both BLM and non-BLM lands.			

Threatened, Endangered, and Other Special Status Species Impacts on BLM lands

Observations of the loggerhead shrike were made between structure sites NZ47 and NZ48, and this species might be affected by the A and F alternatives. If construction is planned during the nesting season (May to August) then the area along the NZ line should be resurveyed to determine if there are loggerhead shrike nesting locations within or adjacent to the construction activity areas. If loggerhead shrikes are determined to be nesting within proximity to construction areas, then the USFWS would be contacted for guidance for avoidance and mitigation.

Gray vireos were observed along the AN line and could be affected by all alternatives. If construction occurs after September 1 and does not extend after April 1, there would be no impact to this species. If construction is planned between April 1 and August 31, the area would be resurveyed and nest locations for gray vireo would be identified. If nest sites are found within or adjacent to the construction area, the NMDGF and the USFWS would be consulted in order to determine methods of constructing the transmission line without impacting the nesting activities of the gray vireo.

No passerine or raptor nests were found within the project area during 2002 biological surveys. However, new nesting seasons would make it possible for new nest sites to be established anywhere in the project area. If the proposed construction activities are to occur during the spring or summer, a new migratory bird survey should be completed. The newly installed transmission lines are not anticipated to present a danger of electrocution to raptors.

TES plant species that could potentially occur in the project area were not found during the 2002 surveys on BLM lands. They could occur in the project area during more favorable climate conditions; however, the project alternatives are not anticipated to have any long-term adverse effect upon the habitat for these species.

Threatened, Endangered, and Other Special Status Species Impacts on Non-BLM Lands

Gray vireos were observed along the AN line and could be affected by all alternatives, as discussed above for BLM lands.

Prairie dog colonies are present along Airport Road (within the Santa Fe city limits) and could be impacted by Alternative O. One prairie dog colony is present in the area of Agua Fria (near A and F alternative alignments). Although construction activities might impact individual prairie dogs, impacts are not anticipated to affect entire colonies.

Although no burrowing owls were identified in the immediate project area, one was identified along the ZB line. Since burrowing owls often move around within prairie dog colonies and since a survey was not performed for the areas of kangaroo rat mounds along the Alternative S alignment, additional surveys are required to determine if burrowing owls are present along applicable alignments of the O and S alternatives. Burrowing owl surveys may be performed from May to September.

No passerine or raptor nests were found within the project area during 2002 biological surveys. However, new nesting seasons would make it possible for new nest sites to be established anywhere in the project area. If the proposed construction activities are to occur during the spring or summer, a new migratory bird survey should be completed. The newly installed transmission lines are not anticipated to present a danger of electrocution to raptors.

TES plant species that could potentially occur in the project area were not found during the 2002 surveys. They could occur in the project area during more favorable climate conditions; however, the project alternatives are not anticipated to have any long-term adverse effect upon the habitat for these species.

3.2.3.6 Avoidance and Mitigation – TES Species

If construction is planned during the spring, the selected alternative would be resurveyed to locate potential gray vireo, loggerhead shrike, and burrowing owl nests as summarized in Table 3-17. If nest sites are found, then coordination would be implemented with appropriate land management agencies for these species to develop construction methodologies that would not adversely impact the nesting activities of these species. If construction occurs during the spring, a raptor survey would be completed of the entire selected alternative project area, to be done in coordination with the USFWS.

Table 3-17. Summary of Actions Relating to Species with Agency Status

Species / Resource	A	F	O	S
Gray vireo	Resurvey along the AN line. If nest sites are found near the project area, the NWDGF and the USFWS should be consulted to develop measures to avoid impacting this species.			
Loggerhead shrike	Resurvey along the NZ line. If loggerhead shrikes are determined to be nesting within proximity to construction areas, then the USFWS would be contacted for guidance for avoidance and mitigation.		None indicated.	None indicated.
Gunnison's prairie dog	Determine potential impacts in Agua Fria area. Coordinate with local entities regarding potential mitigation requirements and/or guidelines.		Determine potential impacts along Airport Road. Coordinate with City of Santa Fe regarding potential mitigation requirements and/or guidelines.	None indicated.
Burrowing owl	None indicated.	None indicated.	Perform surveys in prairie dog colony areas. Coordinate with USFWS for mitigation requirements/guidance.	Perform survey in kangaroo rat mound areas. Coordinate with USFWS for mitigation requirements/ guidance.
Raptor and passerine nests	Resurvey for nest sites. Obtain permits for nest disturbance as necessary.			

Construction activities within Gunnison's prairie dog colonies would be minimized. If the selected alternative involves disturbance of Gunnison's prairie dog colonies within the Santa Fe city limits, coordination and consultation would be initiated with the City of Santa Fe toward the identification of appropriate mitigation measures.

The prairie dog colonies and kangaroo rat mounds within the project area would be surveyed for burrowing owls prior to construction. If burrowing owls are discovered within or immediately adjacent to the project limits, the USFWS would be contacted for guidance on how to proceed with construction activities.

If construction occurs prior to April 1 (and later than September 1), then there should be no impact on the gray vireo. However, if construction occurs during the spring, the area would be resurveyed and nest locations (if any) for gray vireos would be identified. If nest sites are found near the project area, the NWDGF and the USFWS would be consulted to develop measures to avoid affecting this species. Through application of these avoidance and mitigation measures, there are no anticipated impacts that could cause a trend toward federal listing or loss of species viability.

Additional passerine and raptor nest surveys are required for the selected alternative. Based upon current guidance from the USFWS, occupied migratory bird nests cannot be moved or destroyed without a federal permit issued by the service. However, unoccupied nests (except for colonial species) can be removed or destroyed without a federal permit. The optimum time for removal of unoccupied nests occurs from September through mid-February. Any direct impact to a nest site on federal land requires coordination with the land management agency in charge of that land. Generally, any permit to destroy or move a nest would apply only to active nests. If active migratory bird nests are found during these surveys, a permit application would be submitted to the appropriate federal and state agency four to eight weeks before construction begins. The application generally includes the following information: (1) a letter stating the location of the nests, (2) a statement as to why the nests must be destroyed, (3) a site plan or diagram of the property that shows the nest location relative to proposed construction, and (4) proposed mitigation measures to offset the loss of nesting habitat for this species.

In all cases the span between the energized lines is 60 inches or more in width, and the design of the facility has followed guidelines presented in *Suggested Practices for Raptor Protection on Power Lines – The State of the Art in 1996* by the Avian Power Line Interaction Committee (Edison Electric Institute/Raptor Research Foundation 1996).

3.3 Land Use, Recreation and Socio-economics

This section summarizes the land uses, recreation use and socio-economics for the project area. Included is a general description of land jurisdiction and existing and planned land uses, recreation, growth projections, and income and employment. Consequences by alternative address impacts to BLM and non-BLM lands. Both direct impacts to land uses and recreation, and indirect impacts to land values and regional employment and income are addressed.

3.3.1 Affected Environment

The project area is located in the central region of Santa Fe County, centered on the city of Santa Fe. The area is dominated to the north, east, and west sides by lands managed by the Santa Fe National Forest, BLM public land and State Trust Lands. Private lands surround the city and the area to the south of Santa Fe.

These jurisdictional boundaries are shown in Map 3-3. Boundaries are also shown for the City of Santa Fe, the traditional historic community of Agua Fria, and the southwest community planning area.

The 1980 Santa Fe County General Plan and its implementing document, the Santa Fe County Development Code, divided the urbanized areas of Santa Fe into community planning areas. The Southwest Community Planning Area covers the location of Zia Switching Station, portions of the alternative A, F, O, and S alignments within the urban area, and the proposed Zia North Switching Station in Agua Fria (Alternative F). The miles of transmission line within the BLM, state and private land ownership are tabulated by alternative in Table 3-18. The location of project facilities is shown on maps in Appendix A.

Table 3-18. Miles of Transmission Line by Jurisdiction

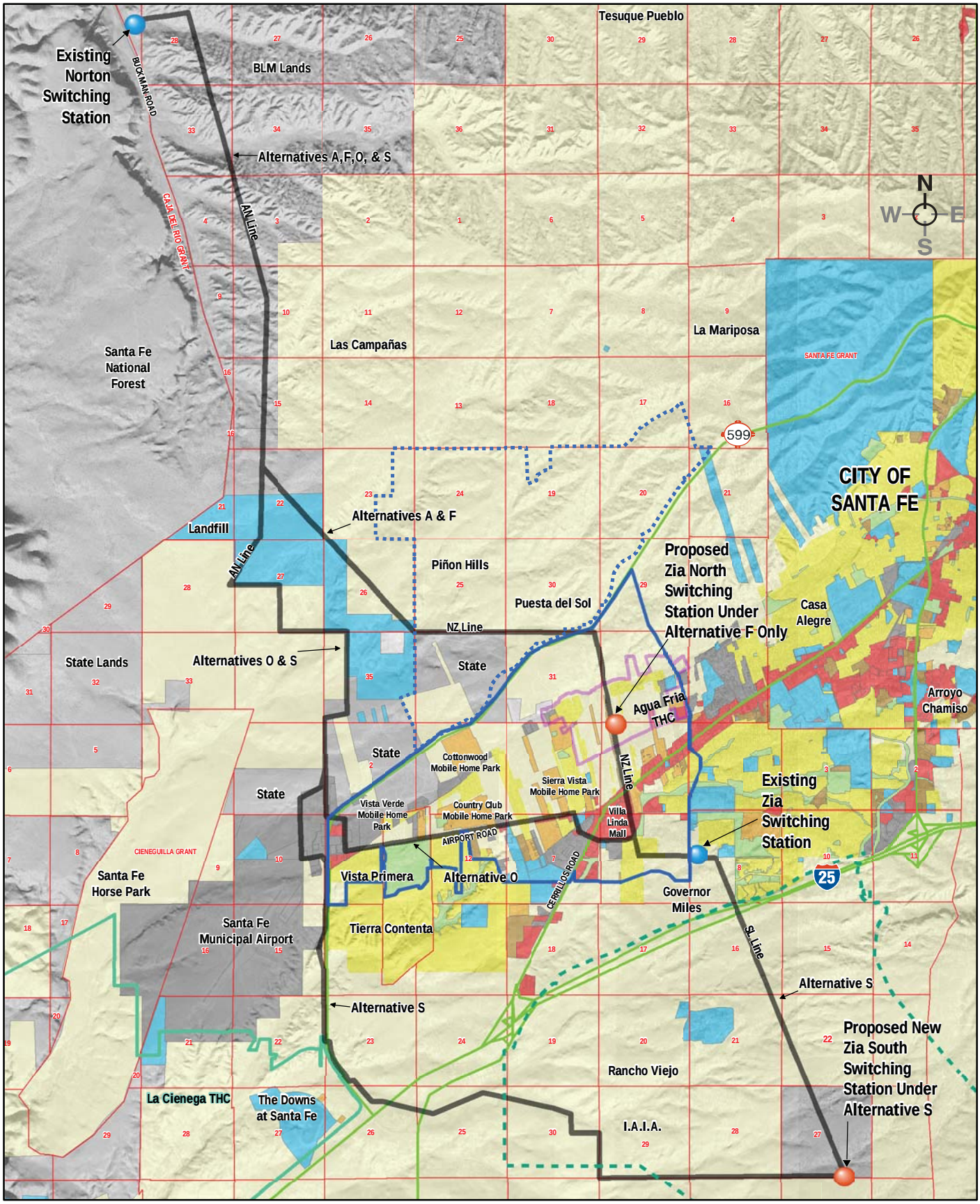
Jurisdiction	Alternative A	Alternative F	Alternative O	Alternative S
BLM	6.17 miles	6.17 miles	6.7 miles (includes BLM land in Sec. 35, T17N, R8E)	6.7 miles (includes BLM land in Sec. 35, T17N, R8E)
State Land	1 miles (in Section 36, T17N, R8E)	1 mile (in Sec. 36, T17N, R8E)	1.07 miles (in Sections 2&3, T16N, R8E)	2.81 miles (in Sections 2&3, T16N, R8E and Section 27, T16N, R9E)
Private Lands	6.07 miles	4.01 miles	8.18 miles	17.11 miles
TOTAL	13.23 miles	11.18 miles	15.96 miles	24.89 miles

3.3.1.1 Land Jurisdiction

BLM Lands

The BLM public lands are primarily consolidated in the north portion of the study area in T18N, R8E and T17N, R8E, and two isolated holdings located in Section 35, T 17N, R8E. All alternatives originate from the Norton Switching Station, located on BLM property. The northern portions of all alternative alignments cross through BLM land to the south along Buckman Road for 6.2 to 6.7 miles.

The Taos Resource Management Plan, dated October 1988, sets forth the land use decisions, terms and conditions for guiding and controlling future management actions on BLM public lands, including those within the project area. The proposed transmission alignments are not within any special BLM management area or right-of-way exclusion area (BLM, 1988). Utility rights-of-way for transmission lines are allowed where linear projects do not result in undesirable impacts to other public resources and values. The close proximity of public lands to the City of Santa Fe creates a high demand for rights-of-way for utilities and communications sites. A number of recreation and public purpose leases and patents have been issued on public land for schools, churches, and recreation areas; these are expected to continue as the communities continue to develop.



LEGEND

- Residential High Density
- Residential Medium Density
- Residential Low Density
- Residential Very Low Density
- Industrial
- Public / Institutional
- Commercial / Office
- Parks & Open Space
- Existing PNM Switching Station Utilized in Alternative
- Proposed Switching Station
- Major Transportation Corridors
- Project Power Alternatives
- Tres Arroyos Planning Area
- SW Area Plan Boundary
- Community College District
- State & Federal Lands

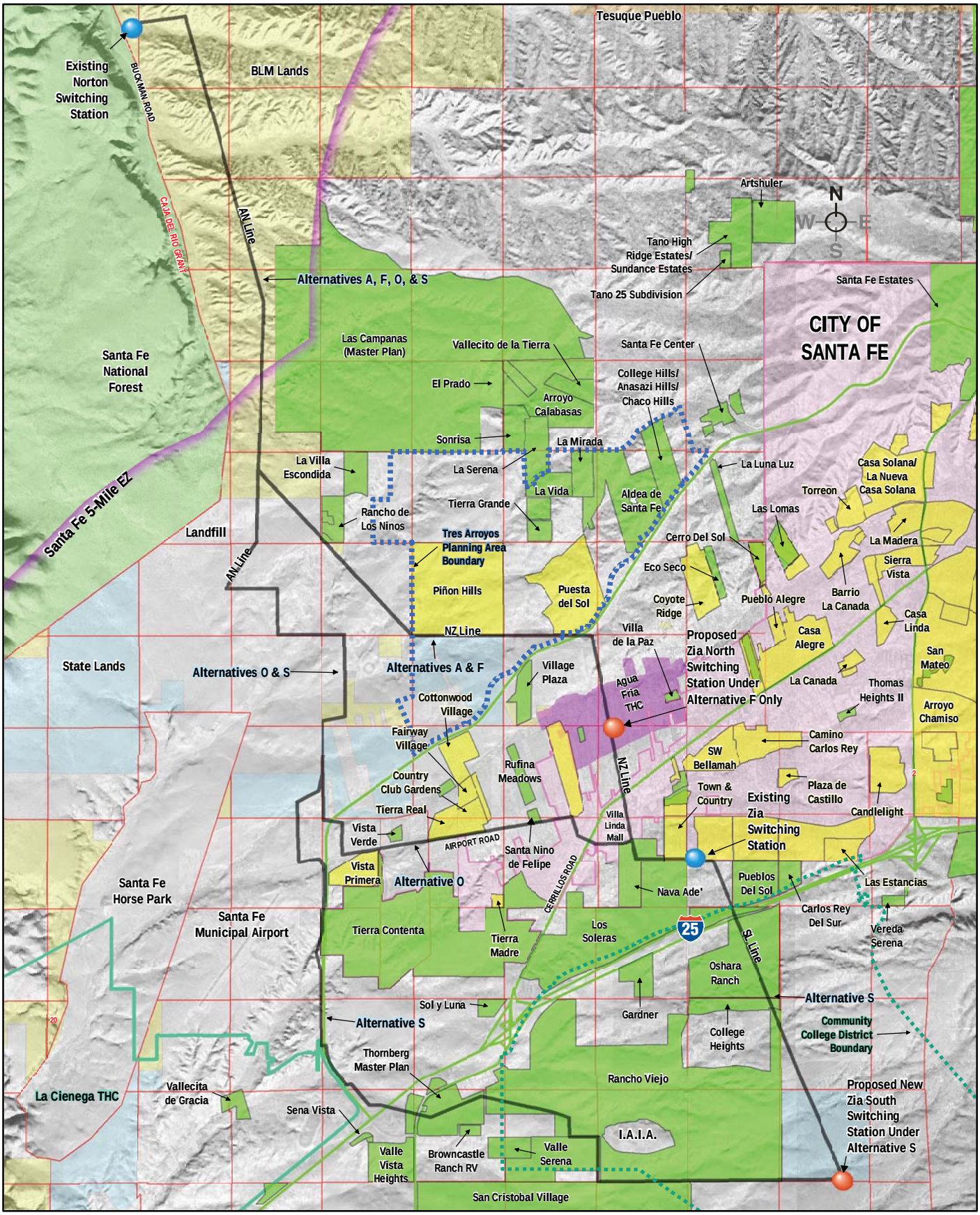
0 0.5 1 2 Miles

SCALE - 1:93,000 or 1" = 7750'

Existing Land Use

SOURCE: 2003 aerial photography, hillshade, and transmission information provided by PNM. City boundaries, roads, land use, and survey section information provided by the City of Santa Fe. Traditional Historic Community boundaries provided by Santa Fe County. Map produced February 9, 2004 by JFSA.

Map 3-3



LEGEND

- Developing Residential and Neighborhoods Not Yet Built-Out
- Existing Residential Neighborhoods
- Agua Fria THC
- State Lands
- BLM Lands
- Santa Fe National Forest
- Project Power Alternatives
- Major Transportation Corridors
- Tres Arroyos Planning Area Boundary
- Community College District Boundary
- Existing PNM Switching Station Utilized in Alternative
- Proposed Switching Station

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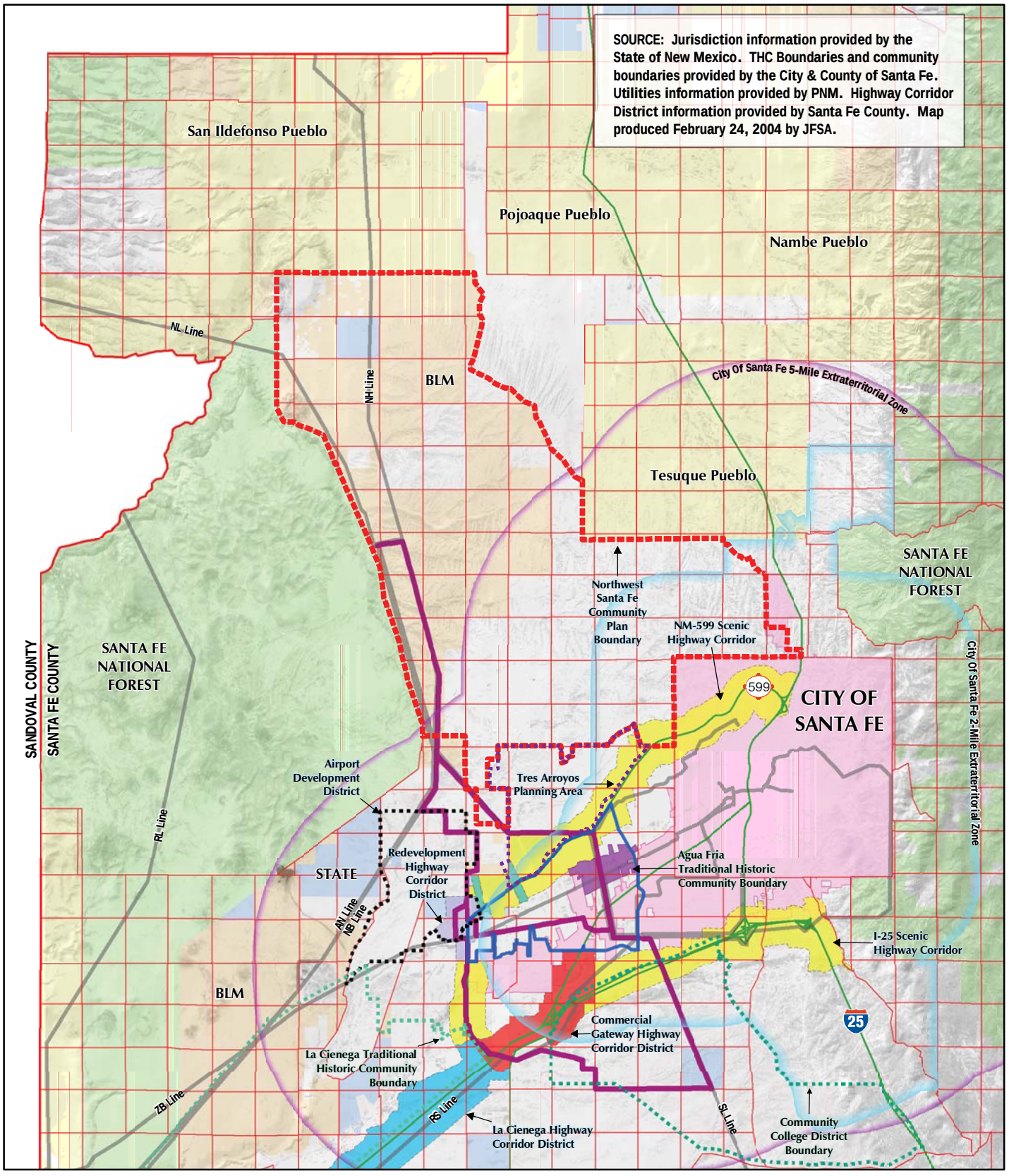
0 0.5 1 1.5 Miles

SCALE - 1:93,000 or 1" = 7750'

Existing and Developing Residential Neighborhoods

SOURCE: 2003 aerial photography, hillshade, and transmission data provided by PNM. City boundaries, roads, land use, hydro, and survey section information provided by the City of Santa Fe. THC boundaries and neighborhood data provided by Santa Fe County. Development data provided by PNM. Map produced February 17, 2004 by JFSA.

Map 3-4



LEGEND

Santa Fe Highway Corridor Districts

- Baca Tracts Highway Corridor
- Commercial Gateway Highway Corridor District
- La Cienega Highway Corridor District
- Redevelopment Corridor District
- Scenic Highway Corridor

Transmission Features

- Other Existing PNM Transmission Lines
- Project Power Alternatives

Other Planning Areas

- City of Santa Fe 2-Mile Extraterritorial Zone
- City of Santa Fe 5-Mile Extraterritorial Zone
- Agua Fria Traditional Historic Community
- La Cienega Traditional Historic Community
- Tres Arroyo Planning Area
- Community College District
- Southwest Santa Fe Planning Area
- Santa Fe Northwest Planning Area
- Airport Development District

N
W E
S

0 0.5 1 1.5 Miles

SCALE - 1:200,000

Community Planning Boundaries

U.S. DEPARTMENT OF THE INTERIOR BUREAU OF LAND MANAGEMENT

Map 3-5

Non-BLM Lands

New Mexico State Lands

State-owned lands include portions of Section 36 T17N, R8E, and Section 2 and 3 T16N, R8E. Alternatives A and F cross state land along the northern boundary of Section 36. Alternatives O and S cross state land between Section 2 and 3. Alternative S also crosses Section 27 T16N, R9E. The land is currently undeveloped. Traditionally, state trust land has been used almost exclusively for mineral extraction and agriculture uses. However, lands near growing municipal areas are now also being considered for rural and economic development. The goals of the trust are to optimize revenues while protecting the health of the land for future generations.

Santa Fe County Rural and Extraterritorial Zone

The zoning around the City of Santa Fe within Santa Fe County consists of a combination of rural zoning within an area around the city limits designated as the Extraterritorial Zone (ETZ). The City of Santa Fe and Santa Fe County have concurrent zoning jurisdiction within 2 miles of the municipal boundary and concurrent planning jurisdiction within 5 miles of the municipal boundary. The Santa Fe County Growth Management Plan, adopted October 26, 1999, recommended that an urban area boundary 5 miles wide be designated between the City of Santa Fe and Santa Fe County to reduce suburban sprawl (Santa Fe County, 1999). The urban boundary would include all lands inside I-25 to the south of the existing city limits, all lands from the city limits in the west and north out to NM-599, and all private properties in the east within the Mountain Special Review District to Arroyo Hondo in the southeast.

The City of Santa Fe and Santa Fe County have concurrent zoning jurisdiction in the ETZ where higher densities can be achieved with urban services and urban amenities, and future neighborhoods can be planned and developed. All alternative corridors occur within the 5-mile EZ boundary, except for the portion at Norton Switching Station and four miles south on BLM land. This zone includes the existing traditional historic community of Agua Fria, the traditional village of La Cienega, the existing and developing neighborhoods such as Piñon Hills, Puesta del Sol, and Rancho Viejo, as well as other neighborhoods in the project area, as shown in Map 3-4.

Alternatives A and F cross near the southern boundary of the Piñon Hills and Puesta del Sol developing neighborhoods and through the village of Agua Fria. Alternative F also includes a proposed new switching station to be constructed in Agua Fria. Alternative S crosses the eastern boundary of the traditional village of La Cienega, the western boundary of the Tierra Contenta neighborhood, and through the developing neighborhood of Ranch Viejo.

Agua Fria is one of 37 traditional communities recognized in the Santa Fe County Growth Management Plan where there has been a long history of family settlement, a pattern of diverse and mixed community land use, presence of historic structures and existence of a village center. The traditional community concept was devised to recognize areas in the county that had already been settled at densities higher than allowed by the hydrologic studies in the 1980 Santa Fe County General Plan. The 1980 General Plan assigned a critical

population size for each community based on land area and available water resources over a period of 100 years. The traditional pattern of development is homes and buildings clustered around a commercial center for easy access, away from irrigated fields and grazing lands that are an essential part of the mixed land use. The village runs south to north from Rufina Street to the Santa Fe River and east to west from Henry Lynch Road to just beyond Lopez Lane. Beginning in the 1920s, plots of land were subdivided into long, narrow parcels oriented such that a maximum number of landowner heirs could access water from the Santa Fe River and acequias.

In addition to the traditional community status, Agua Fria has another community status available in Santa Fe County as a Traditional Historic Community (THC). The State Legislature created this designation in 1995. This designation allows for a community to be excluded from the extraterritorial zoning authority of a municipality and, instead, allows it to be subject to the zoning jurisdiction of the county. Agua Fria is in the process of developing a community plan that would help to preserve the lifestyle and character of the semi-rural residential area while providing for a sensitive urban development, mix of land uses and residential densities.

The area north of the Santa Fe River to NM-599 is predominantly undeveloped land (47 percent) due to floodplain and rural/traditional residential uses that radiate longitudinally north and south perpendicular to the river. The proposed design for the future is to continue with the traditional land pattern and create rural protection areas north of the Agua Fria THC.

Southwest Santa Fe Community Area Master Plan

The Southwest Santa Fe Community Area Master Plan was initiated through Santa Fe City Council resolution #1999-71, passed July 14, 1999 (ACP, Spears Architects and Western Networks, 2001). NM-599 borders the planning area to the northwest, by the northern boundary of Tierra Contenta and Governor Miles Road to the south and by Richards Avenue to the east (see Map 3-5, and maps in Appendix A). Most of the land outside the municipal boundary is in the Extraterritorial Zone. The Village of Agua Fria described above is included in this plan. Alternatives A and F pass through the Village of Agua Fria. Alternative F ends at the proposed switching station in Agua Fria, and Alternative A continues to the Zia Switching Station, located in the southeast portion of the planning area on Richards Avenue. A portion of Alternative O is adjacent to and parallel to Airport Road, which runs west to east through the center of the planning area to the Zia Switching Station. Alternative S runs near the western boundary of the planning area and crosses into the planning area from the south to the Zia Switching Station.

As indicated in the Southwest Santa Fe Community Area Master Plan, residential use along Airport Road includes Vista Verde and Country Club Mobile Home Parks, Vista Primera, Tierra Contenta, the Sierra Verde Mobile Home Park, and other scattered residential use. The intersection of Airport Road and NM-599 includes an array of accompanying commercial and industrial uses located adjacent to residential neighborhoods without any buffering or separation. The Santa Fe Country Club, a private recreation area, is located on the south side of Airport Road.

The area around the intersection of Cerrillos Road and Rodeo Road consists of a mix of commercial, residential and undeveloped land. The traditional rural land holdings of the Agua Fria Village are located north of Cerrillos Road. Commercial development is the dominant use along Cerrillos Road. The Villa Linda Mall is located at the southeast intersection of Cerrillos and Rodeo roads. The area south of Cerrillos Road consists of commercial use and car dealerships. The area north of Rodeo Road includes a mix of regional retail and single-family residential. The area south of Rodeo Road has been residential; however, there has been a transition along Rodeo Road where former residential homes have been converted to low-intensity commercial offices and restaurants. The Nava Ade' residential subdivision is also located south and east of the Villa Linda Mall.

The area around the Zia Switching Station is zoned for low- to medium-density residential. The proposed plan includes a rural protection zone for the Town and Country Subdivision and adjacent parcels along Richards Avenue, to protect the semi-rural nature of the area.

Santa Fe Metro Area Highway Corridor Plan

This plan designates an overlay zone for the Highway Corridor District and includes land use zoning and design standards. The highway corridor study area includes approximately 15 miles of I-25 and 15 miles of NM 599, Veterans Memorial Highway. The corridor district is divided into 5 districts (see Map 3-5):

- Scenic Corridor District
- La Cienega Corridor District
- Commercial Gateway District
- Redevelopment District
- Airport Road Planning Area

Project alternatives occur in four of the five districts (all but the La Cienega Corridor District). Development occurring in this plan area includes the Komis Business Park, a portion of Tierra Contenta (1,331-acre residential development), and other residential development along Airport Road. Portions of Alternative S are located within this plan area; alternatives A, F, and O cross this plan area.

The Airport Redevelopment District Plan is being created to guide development in the area around NM-599 and Airport Road (Map 3-5) and is moving forward as part of the Santa Fe Metro Area Highway Corridor Plan. The plan is seeking to focus on mixed-use, commercial development, and developing the intersection area as a gateway. (Personal communication, Feb. 27, 2004) Alternative O would occur within this plan area.

The Santa Fe Community College District Plan

The Santa Fe Community College District Plan (Resolution 2000-148) seeks to create neighborhoods and a community, which can sustain itself over time, focusing on compact village development. The area is north of Eldorado and the San Marcos Land Grant, south of I-25, east of NM-14, and generally west of the

Burlington Northern Santa Fe railroad right-of-way (Map 3-5). There are 12 village zones in the plan supported by employment centers. The Community College Plan is presented as a long-term project taking years to reach full build-out. Developments include Rancho Viejo (22,000-acre mixed use development), a portion of San Cristobal Village (1,818-acre residential development), Oshara Ranch (470-acre residential development), Sonterra (244-acre residential development) and commercial use around NM-599 and N. Highway 14 such as the Thornburg development and Turquoise Trail Business Park. Alternative S occurs within this plan area.

City of Santa Fe Parks, Open Space, Trails, and Recreation Master Plan

This plan identifies and describes existing park resources and goals and includes a needs assessment for additional parks and recreation facilities. Located in the project area, the Municipal Recreation Complex is a regional park of 628 acres. It consists of a golf course, six softball fields, two baseball fields, six soccer fields, and one rugby field. The fields are used extensively during the spring, summer, and fall seasons (Personal communication, February 24, 2004). The golf course is open year-round. Portions of all alternative alignments cross this park. Several east-west trending trails are proposed in the project area and one north-south trail is proposed along the existing NZ line along the alignments of alternatives A and F.

Open Land and Trails Plan

Adopted May 22, 2000, this plan addresses long-term strategies for open land and trails conservation in the county, and to guide the county in a program to evaluate, acquire, develop and manage parks, open lands, and trails. It includes an inventory of existing parks and trails in the county and identifies recommendations for future parks and trails, as well. The county used a citizen-based planning process to encourage partnership for effective stewardship. All alternative alignments occur within this plan area.

Santa Fe Northwest Community Plan

The Santa Fe Northwest Community (SNAC) Plan (Santa Fe Extraterritorial Zoning Authority Ordinance No. 1999-2, approved and adopted June 29, 1999) provides direction for development in the area over the next 25 years. SNAC is comprised of 17 member neighborhoods northwest of the city limits, along Tesuque Pueblo's southern and western borders, roughly paralleling Buckman Road on the west, just south and west of Pojoaque Pueblo on the north, covering approximately 80 square miles. All alternative alignments go through this planning area.

La Cienega and La Cieneguilla Community Plan

The La Cienega and La Cieneguilla Community Plan, adopted August 14, 2001, covers water quantity, water quality and wastewater, open space, agricultural lands, roads, fire protection, utilities, land use, and the airport, with goals and implementing actions for each. The planning emphasis covers a large geographic area, including the community of La Cienega along the I-25 corridor south to La Bajada (Map 3-5). The Alternative S alignment is adjacent to the eastern boundary of this plan area.

Santa Fe County Open Land and Trails Plan

Adopted May 22, 2000, this plan addresses long-term strategies for open land and trails conservation in the county, and to guide the county in a program to evaluate, acquire, develop and manage parks, open lands, and trails. It includes an inventory of existing parks and trails in the county and identifies recommendations for future parks and trails, as well. The county used a citizen-based planning process to encourage partnership for effective stewardship. All alternative alignments occur within this plan area.

Airport Development District Plan

This effort is currently in the planning stages. The plan area encompasses a large geographic area from Caja del Rio Road west approximately 2 miles and bordered by the county landfill on the north and Airport Road on the south (Map 3-5). The new New Mexico Department of Game and Fish facility is located in this plan area. Also, undeveloped lands, industrial and commercial uses occur in this area where portions of all alternatives are located.

Tres Arroyos Contemporary Community Plan

The Tres Arroyos planning area is located in the project area. Residents of this community are currently in the process of developing a community plan with Santa Fe County for their area as a contemporary community. The Tres Arroyos boundary is delineated as the Municipal Recreation Complex on the west, NM-599 on the south, and Las Campanas on the north. Issues being addressed by the plan include identifying proposed trail connections and acquiring trail access, addressing commercial uses, lighting, and retaining current residential densities (Personal communication, February 24, 2004). Portions of alternatives A and F occur in this plan area.

City of Santa Fe

The City of Santa Fe's General Plan, adopted in 1999, serves as the city's long-range statement of direction for physical development and conservation. The policies of the General Plan are reflected in 14 themes that are representative of city-wide concerns ranging from character and urban form to economic diversity and water. The city limits are shown in Map 3-5.

3.3.1.2 Existing Land Use and Recreation

Existing land use in the project area includes a range of residential, commercial, industrial, and recreation uses in undeveloped, rural, developing urban, and urban settings. These are illustrated on the Existing Land Use map (Map 3-3) and on the neighborhood map (Map 3-4).

BLM Lands

The BLM's Taos Resource Management Plan (RMP) (BLM 1988) provides management direction for BLM public lands managed by the Taos Field Office. BLM land traversed by the alternative corridors is not identified in the RMP as having special management requirements or specific program guidance since it is undeveloped and used primarily for grazing. No right-of-way exclusion areas are located along the proposed corridors. This indicates that BLM lands in the project area allow for utility rights-of-way on a case-by-case basis. The BLM land near Norton Switching Station is under consideration as an Area of Critical

Environmental Concern (ACEC) for cultural resources and recreation values. BLM could begin the designation process in 2004 with potential ACEC designation sometime in 2005. Certain lands closer to the city have been designated for disposal by the BLM. This includes lands along a portion of alternatives O and S in section 35 T17N, R8E.

Recreation users of the Diablo Canyon area and US Forest Service lands access them via Buckman Road, which passes Norton Switching Station. These two areas are used for swimming, boating, fishing, rock-climbing, birding, horseback riding, rock hounding, picnicking, hunting, shooting, hiking, off-highway vehicle use, and camping four miles northwest and two miles west of Norton Switching Station (Tetra Tech, Inc., April 2003). Traffic counts along Buckman Road in 2002 indicated that over a five-weekend period, 94 percent of the 249 vehicles traveling past Dead Dog Well on Buckman Road were doing so for recreational purposes (Tetra Tech, Inc., April 2003).

Non-BLM Lands

Within the city limits, commercial uses occur along Cerrillos Road and Rodeo Road with residential use at Nava Ade' southeast of Villa Linda Mall.

In the county, the project area includes a mix of undeveloped, rural lands, low density rural residential use, commercial and industrial use, developing urban, and compact village development. The Santa Fe Airport is located southwest of the intersection of Airport Road and NM-599. Land use in the project area is shown in Map 3-3 and existing and residential neighborhoods are shown in Map 3-4.

Recreation in the project area includes the Municipal Recreation Complex, the Santa Fe Country Club, and a variety of city and county recreation trails that cross the area. An area of approximately 50 acres on the south edge of the Municipal Recreation Complex has been recommended for development for off-road vehicle use (such as ATVs or BMX bikes) (Personal communication, February 23, 2004).

Trail-related activities are the most popular group of active recreation activities in the state (City of Santa Fe 2001). Numerous trails in the city and county occur in the project area, and are used for bicycling, walking, hiking, and jogging. Generally, these are located along existing transportation corridors (roads and rail access) (City of Santa Fe 2001). The value of open space and trails is recognized as one of New Mexico and Santa Fe County's greatest assets with outdoor natural resources and recreation opportunities (Santa Fe County 2000). Extensive planning has occurred regarding trails and open land over the past 5 to10 years in the city and the county, as documented in the county's Open Land and Trails Plan and the city's Parks, Open Space, Trails and Recreation Master Plan (City of Santa Fe 2001; Santa Fe County 2000).

Planning for future trails in the project area is focusing on linkages to further enhance the existing network by utilizing linear elements such as arroyos, the Santa Fe River streambed, roads, and utility easements that would expand the existing trail system into outlying areas (Personal communication, February 24a,

2004; Personal communication, February 24b, 2004; Personal communication, February 26, 2004).

3.3.1.3 Socio-economics

This section provides growth projections for population, employment and dwellings for the greater Santa Fe area (City of Santa Fe, January 1999). No recent growth projections for Santa Fe County are available at this time; however, it is assumed that the majority of the information presented would occur in the Greater Santa Fe Area. In addition, data for 2001 household income and employment are provided for Santa Fe County.

The heritage resources of Santa Fe are considered to be one of the major assets of the city. Growth in the city has resulted in a mix of moderate and low-density residential areas further out from the city, and community-oriented retail uses in outlying locations. The long-term goal for land use is to maintain the archaeological, historic and cultural heritage of the region; respect Santa Fe's unique personality, sense of place and character; and ensure quality of life in the communities (City of Santa Fe, 2002).

Land use and growth management goals for the Southwest Santa Fe Community Area Master Plan include the following:

- The neighborhood is and remains the basic building block of the community.
- Complementary to the neighborhoods are mixed-use commercial areas, located within a reasonable walking distance of the neighborhoods, which provide job opportunities, services and certain amenities to the people who live there.
- Civic spaces are part of each neighborhood and schools are introduced within these areas whenever possible.
- Great care and consideration are given to the natural features of the area. These features should be integrated and respected in any planning process.

The 2020 growth projection area includes the 5-mile ETZ. Region-wide growth has occurred in Santa Fe County from 1980 to 2000. During this period, approximately 11,000 dwelling units were permitted in the urban area and 8,000 outside the urban area. A low and high growth projection has been made for the county for 2020. The low growth projection is based on an average annual increase of 1,200 residents that would result in 25,000 new residents and 13,000 new dwellings in 2020. This reflects moderate employment growth in the region with government employment and tourism related service employment continuing to dominate. New major employment in the region is not anticipated, and approximately 65 percent of all residential growth would be in the urban area and 35 percent outside the urban area. The high growth projection is for 40,000 new residents and 20,000 new dwelling units. Growth is based on the trend that occurred from 1980 to 2000 and includes a new major employer locating in the region. Approximately 55 percent of all residential growth would be located within the urban area and 45 percent outside the urban area. Table 3-19 shows the low and high population projections for Santa Fe region and Table 3-20

shows the low and high growth population projection for the area outside the southwest urban area of Santa Fe.

Table 3-19. Population Trend and Projections for Santa Fe Region

Year	Urban Area		Regional Area	
	Low Projection	High Projection	Low Projection	High Projection
1980	55,000		64,000	
1990	66,000		82,000	
2000	75,000	77,000	95,000	101,000
2010	83,000	88,500	105,000	114,000
2020	91,000	100,000	115,000	126,000

Source: City of Santa Fe General Plan, 1999

Table 3-20. 2000-2025 Growth Projections West and Southwest of the Urban Area

Urban Regions	Low Growth Projection		High Growth Projection	
	Dwellings	Employment	Dwellings	Employment
West of Relief Route	550	400	1,000	600
Las Campanas	250	50	650	150
La Cienega/Airport	300	600	300	600
Between I-25 and NM 14	200	300	450	700
Rancho Viejo	1,500	1,500	3,700	3,600
TOTAL	2,800	2,850	6,100	5,650

Source: 2020 Growth Projections, City of Santa Fe Planning & Land Use Dept, Planning Division, January 1999

Residential developments such as Tierra Contenta, Las Campañas, and Rancho Viejo provide much of the land that will house new residential growth through 2020. These communities are currently approved to accommodate 9,000 to 10,000 new housing units. In addition, city and county plans call for compact and higher density growth south of Tierra Contenta, south of Villa Linda Mall, portions of greater Agua Fria, and portions of Rancho Viejo.

Most of the land required for 2020 growth has already been master planned and some of it has already been subdivided. Non-residential land requirements are based on recent studies that show a relationship of the number of jobs per dwelling unit at a ratio of approximately 1:1. The 2020 population projection is for 13,000 to 20,000 new housing units and 13,000 to 20,000 additional jobs. Approximately 9,500 to 13,000 of these jobs would occur in the urban area as shown in Table 3-21. The employment density per business sector and the amount of projected acres of land proposed for non-residential use are shown in Table 3-22.

Table 3-21. 2000-2025 Growth Projections in Southwest Urban Area

Urban Regions	Low Growth Projection		High Growth Projection	
	Dwellings	Employment	Dwellings	Employment
Infill	1,000	3,200	1,000	3,500
Tierra Contenta	3,000	2,100	4,000	2,900
Villa Linda Mall South	1,750	2,500	2,000	3,000
Greater Agua Fria	1,125	1,000	1,400	1,700
Tierra Contenta South	500	600	1,000	1,500
TOTAL	7,375	9,400	9,400	12,600

Source: 2020 Growth Projections, City of Santa Fe Planning & Land Use Dept, Planning Division, January 1999

Table 3-22. 2000-2020 Land Use Projection for Non-Residential Development

Service Sector	Employed Persons per Acre	Lower Growth		Higher Growth	
		Employment	Acres	Employment	Acres
Office/Service	30	7,540	251	11,600	387
Retail	20	4,291	215	6,600	330
Manufacture	10	1,170	117	1,800	180
TOTAL		13,000	583	20,000	897

Source: 2020 Growth Projections, City of Santa Fe Planning & Land Use Dept, Planning Division, January 1999

Income and Employment

In 2001, total household income for Santa Fe County was $4.15 billion, and total employment was 82,811, including 6,300 construction workers (Bureau of Economic Analysis, Regional Economic Accounts 2004).

3.3.2 Environmental Consequences

The following sections describe land use and recreation impacts by alternative, followed by socio-economic impacts (refer to the maps in Appendix A for facility locations and developments).

3.3.2.1 No Action

No change in land use would occur with the No Action alternative. No change would be made to the transmission lines, Norton Switching Station or Zia Switching Station. Growth is expected to increase in the Santa Fe region as projected. The proposed project is not expected to change the current zoning or proposed land use.

Additional support for the increasing electrical demand is needed by 2004. Area growth would continue to put an increased demand on the electrical system; therefore, the ability to provide reliable electric service to the area would remain at risk (see Chapter 1, Purpose and Need).

3.3.2.2 Alternative A

BLM Lands

Alternative A is compatible with the BLM Taos Resource Management Plan. The proposed changes are limited to rebuilding approximately 36 existing structures and installing one new structure within an existing utility corridor along the AN line; double-circuiting about 4 NZ structures; and modifying the Norton Switching Station within the existing yard area. No new access would be required. The proposed increase in ROW from 40 feet to 75 feet along the AN line would not conflict with resource management in the area. The area of the NZ line on BLM land would not require an increase in ROW width, but would require changing three structures to double-circuit.

Non-BLM Lands

No change in land use would occur with Alternative A. The transmission line would be rebuilt to double-circuit through state and private lands utilizing an existing transmission line corridor. No additional right-of-way is planned. Replacing the line with double-circuit poles through the Agua Fria THC would not cause a change in lifestyle or affect the multiple land use practices currently being used. Land use planning for the area north of Agua Fria includes continued use of the traditional land pattern and rural lifestyle. Double-circuiting the line would be compatible with these future plans. Alternative A also crosses the Nava Ade' subdivision, southeast of Villa Linda Mall. Double-circuiting the line through this area would utilize an existing transmission corridor and would be compatible with the developing plans. Alternative A, an existing utility corridor, already provides a linear element for potential trail use. No new land purchase would be required for the retrofit of the Zia Switching Station.

3.3.2.3 Alternative F

BLM Lands

Alternative F is compatible with the BLM Taos Resource Management Plan. The proposed changes are the same as described for Alternative A on BLM lands.

Non-BLM Lands

No change in land use would occur with the construction of the transmission line along the NZ line, as described for Alternative A. Alternative F, an existing utility corridor, already provides a linear element for potential trail use. Approximately 1.5 acres of land would be required for the new switching station; this would affect three or more landowners. The traditional tracts of land are very long and narrow and parallel the transmission corridor. These tracts are frequently subdivided into smaller parcels to heirs of the original landowner.

The construction of a new Zia North Switching Station would be incompatible with the Agua Fria THC, based on comments received. The community has expressed strong opposition to a new switching station within THC and believes that construction of a switching station in Agua Fria would not be compatible with the traditional lifestyle and land use present in the historic community.

3.3.2.4 Alternative O

BLM Lands

Alternative O is compatible with the BLM Taos Resource Management Plan. The proposed changes are limited to rebuilding about 40 existing structures and building one new one within an existing utility corridor along the AN line; building about 6 more new structures; and modifying the Norton Switching Station within the existing yard area. No new access would be required. The proposed increase in ROW from 40 feet to 75 feet along the AN line would not conflict with resource management in the area.

Non-BLM Lands

A new line segment through state and private lands would require the acquisition of approximately 4.6 miles of new right-of-way from the point of departure from the AN line corridor to Airport Road, and would be located along Caja del Rio Road. Alternative O would cross through the Airport Redevelopment District near the intersection of Airport Road and NM-599 and would be compatible with the commercial and industrial uses there.

The new line along Airport Road would be located in an existing distribution line right-of-way; however, additional right-of-way would also be needed for the new line location south and east of Airport Road and Cerrillos Road to its crossing with the existing NZ line corridor leading to the Zia Switching Station. The alternative would be adjacent to the recently completed New Mexico Department of Game and Fish facility. Alternative O would provide a linear element for potential trail use. The transmission corridor along Airport Road would not bisect any neighborhood communities. The only residential area crossed would be the traditional housing area along Jemez Road. New right-of-way would be required for Alternative O, but it would not change the existing or planned land use. No additional land purchase would be required for the retrofit of the Zia Switching Station.

3.3.2.5 Alternative S

BLM Lands

Alternative S is compatible with the BLM Taos Resource Management Plan. The proposed changes are the same as described for Alternative O on BLM lands.

Non-BLM Lands

A new line segment through state and private lands would require the acquisition of approximately 13.6 miles of new right-of-way from the point of departure from the AN line corridor to the proposed new Zia South Switching Station on the SL line. The primary land use concern is potential ROW impacts to future lots in Rancho Viejo and San Cristobal Village.

The alternative would be adjacent to the recently completed New Mexico Department of Game and Fish facility. The Alternative S corridor passes near the Santa Fe Airport and along the boundary of Tierra Contenta and La Cienega traditional community, but does not cross through these areas; however, the new line would parallel NM-599 through portions of the Scenic Corridor District designated in the Santa Fe Metro Highway Corridor Plan as well as through the Redevelopment District. It would cross through the Thornburg commercial

development along the existing RS 115kV Line, through a portion of Rancho Viejo, and between the boundary of Rancho Viejo and Sonterra. It would continue along the boundary between Rancho Viejo and San Cristobal Village. Alternative S would provide a linear element for potential trail use. This new line, plus the proposed Zia South Switching Station located along the SL line, could affect future community development associated with Rancho Viejo, identified in the Community College District Plan. The existing SL Line traverses the proposed Oshara Ranch residential project. The rebuild of the SL line to single-pole configuration would utilize an existing transmission corridor.

3.3.2.6 Socio-economic Impacts

Land Values

Concerns have been raised by individuals regarding impacts of transmission lines on land values. A recent study released by the Electric Power Research Institute (EPRI, 2003) concluded that:

- There is evidence that transmission lines have the potential to decrease nearby property values, but this is usually small (6.3 percent or lower).
- Lots adjacent to the right-of-way often benefit; lots next to adjacent lots often have value reduction.
- Higher-end properties are more likely to experience a reduction in selling price than lower-end properties.
- The degree of opposition to an upgrade project may affect the size and duration of the sales-price effects.
- Setback distance, right-of-way landscaping, shielding of visual and aural effects, and integration of the right-of-way into the neighborhood can significantly reduce or eliminate the impact of transmission structures on sales prices.
- Although appreciation of property does not appear to be affected, proximity to a transmission line can sometimes result in increased selling times for adjacent properties.
- Sales-price effects are more complex than they have been portrayed in many studies. Even grouping adjacent properties may obscure results.
- Effects of a transmission line on sales prices of properties diminish over time and all but disappear in five years.
- Opinion surveys of property values and transmission lines may not necessarily overstate negative attitudes but they certainly understate (or ignore) positive attitudes.
- The release of findings from the Swedish study on EMF and health effects had no measurable influence on sales prices.

Given these conclusions, it is possible that some land values may be affected in the short-term by alternative corridor development adjacent or through residential areas, depending on the location.

Income and Employment

As shown on Table 3-23, total labor and services income for the alternatives represents an estimated 50 percent of the construction costs for each alternative. An estimated 50 percent of the total work force would come from the local area of Santa Fe County, resulting in approximately 10 to 15 jobs, and $3 to 3.6 million in income from labor and services. While the actual source of the construction work force and services required for the project would be determined by the construction contractor, planning assumptions by PNM are that resources from the local area of Santa Fe County would be utilized to the extent reasonable. The construction timeframe is 6 to 8 months. Line construction on BLM lands is estimated to take 2 months, and modifications to the Norton Switching Station are estimated to take 4 months.

Table 3-23. Estimated Construction Costs and Work Force and Schedule Assumptions

Alternative	Construction Costs ($ Million)	Total Labor and Services Income ($ million) (est. 50% of total construction costs)	Local Labor and Services Income ($ million) (est. 50% of total labor and services)	Work Force: Transmission Line		Work Force: Switching Stations		Project Schedule	
				Total Line Workers	Local Workers (est. 50% of total workers)	Total Station Workers (10 per station)	Local Workers (est. 50% of total workers)	Total Project	BLM Lands
A	$12.0	$6.0	$3.0	20	10	20	10	6-8 months	AN Line: 2 months Norton Switching Station: 4 months
F	$14.0	$7.0	$3.5	20	10	20	10		
O	$13.3	$6.7	$3.3	20	10	20	10		
S	$14.3	$7.2	$3.6	20	10	30	15		

The estimated direct income of $3 – $3.6 million from local labor and services resulting from the construction of alternatives would add to the local economy of Santa Fe County, which had a total household income of $4.15 billion in 2001. The work force of 10 to 15 local workers could be supplied from the Santa Fe area, which had a total of 82,811 total employed in 2001, including 6,300 construction workers. The non-local workers for the project who locate in the Santa Fe County area during construction would also add to the area economy. In summary, the impact of the project is considered to be a welcome, but not significant, contribution to the area's economic activities.

3.4 Environmental Justice

Executive Order 12898 "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" (February 11, 1994) directs federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations. A disproportionate impact is

defined as an impact that is predominately borne by a minority population and/or a low-income population and that is appreciably more severe or greater in magnitude than the adverse effect that would be suffered by the non-minority and/or low-income population.

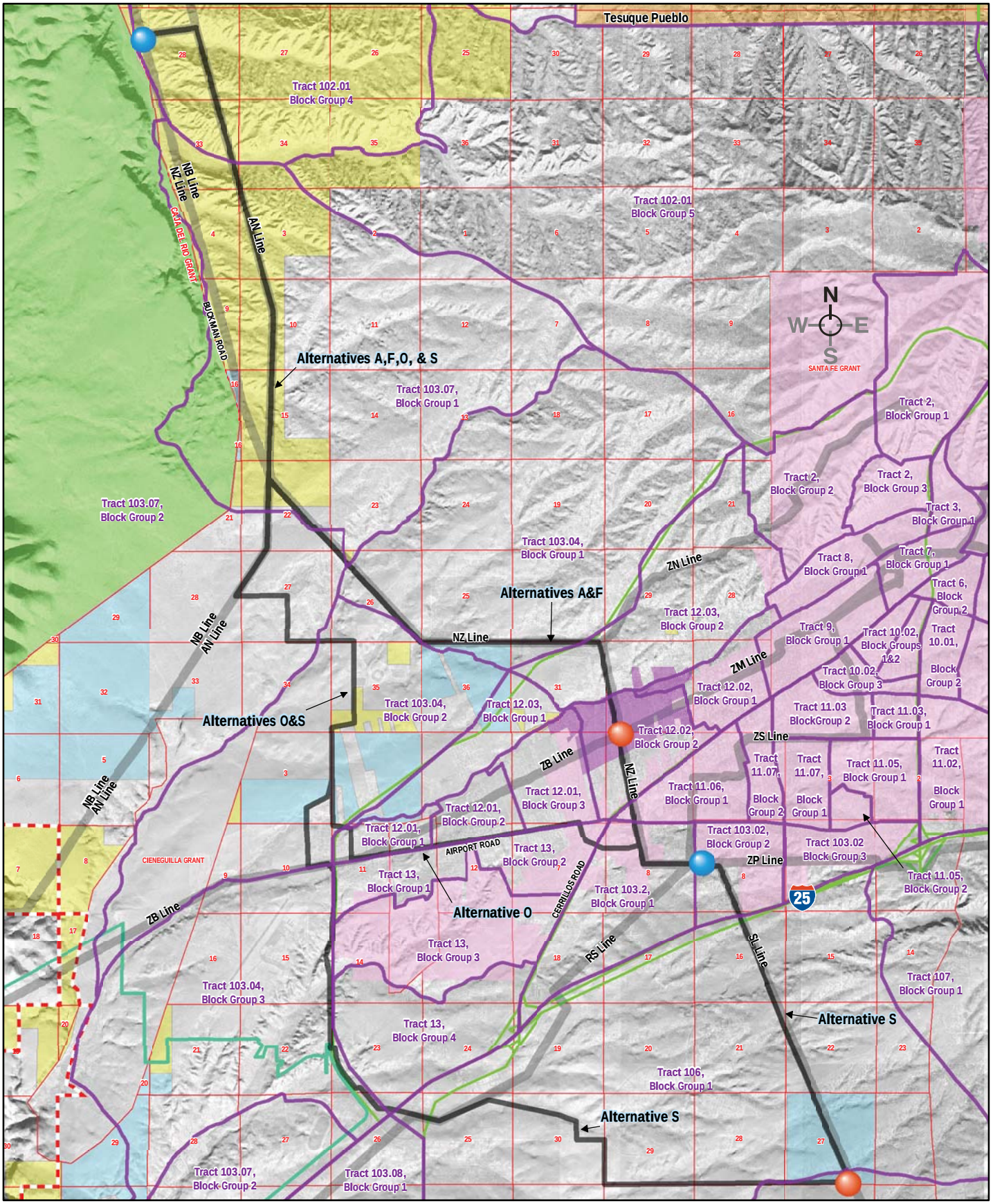
To carry out an evaluation of potential environmental justice issues, a series of steps were taken:

1. Determine the presence of minority and/or low-income populations within and adjacent to the transmission corridor areas.
2. Identify issues from the low-income and minority communities and ensure that all communities are sufficiently involved in the decision-making process.
3. Determine whether environmental impacts are adverse with mitigation in place.
4. Determine whether environmental impacts are likely to fall disproportionately on minority and/or low-income members of the community.

3.4.1 Affected Environment

3.4.1.1 Minority Populations

A portion of each project alternative crosses through the neighborhoods that make up the Southwest Santa Fe Community Planning Area and the 5 mile ETZ planning zone around it. Alternatives A and F cross through the eastern end of the planning area and the THC of Agua Fria. Alternative O is adjacent to and parallel to Airport Road, which runs west to east through the center of the planning area. Alternative S runs near the western boundary of the planning area and crosses into the planning area in the southeastern corner. The 2000 Community Development Block Group Data (CDBG) within these boundaries were used to identify minority populations. The census tracts associated with the alternatives are listed in Table 3-24 and block groups are illustrated on Map 3-6.



LEGEND

- Proposed Switching Station Utilized in One or More Alternative(s)
- Existing PNM Station Utilized in Alternatives
- Project Power Alternatives
- 2000 Census Block Group Boundaries (Tract Number and Block Group Numbers Listed)
- Existing Transmission Corridors
- La Cienega Traditional Historic Community
- Major Transportation Corridors
- City of Santa Fe
- Agua Fria Traditional Historic Community
- Section Boundaries
- Bureau of Land Management
- Santa Fe National Forest
- Bureau of Indian Affairs
- State Lands
- BLM La Cienega Area of Critical Environmental Concern

2000 U.S. Census Block Group Boundaries

0 0.5 1 2 Miles

SCALE - 1:93,000 or 1" = 7750'

MAP 3-6

Table 3-24. Community Development Block Groups used for Minority Populations

Alternative A	Alternative F	Alternative O	Alternative S
Tract 11.06 Block Group 1	Tract 12.02 Block Group 2	Tract 11.06 Block Group 1	Tract 12.01 Block Group 1
Tract 12.02 Block Group 2	Tract 12.03 Block Group 2	Tract 12.01 Block Group 1	Tract 13 Block Group 1
Tract 12.03 Block Group 2	Tract 103.04 Block Group 1	Tract 12.01 Block Group 2	Tract 13 Block Group 3
Tract 103.02 Block Group 1		Tract 12.01 Block Group 3	Tract 13 Block Group 4
Tract 103.04 Block Group 1		Tract 13 Block Group 1	Tract 103.02 Block Group 1
		Tract 13 Block Group 2	Tract 103.04 Block Group 2
		Tract 103.02 Block Group 1	Tract 103.04 Block Group 3
		Tract 103.04 Block Group 2	Tract 106 Block Group 1

Community Development Block Group Data, 2000

Historically, people with an ethnic background of Hispanic origin have settled in the City of Santa Fe and Santa Fe County. The city and county ratio of Hispanic to non-Hispanic is approximately 1:1. In the southwest planning area, the percentage of Hispanics is much greater, with a ratio of 2.1:1 for Hispanic (68.8 percent) to non-Hispanic (31.2 percent). Whites are the dominant non-Hispanic racial group. They account for 91 percent of the non-Hispanic population. Two percent of the minority population is Native American Indian, and the percentages of Asian, Black and the other races are less than one percent.

Approximately half of the census blocks in the southwest planning area have minority populations greater than 75 percent, as shown in Table 3-25. Alternative A and F would cross through Agua Fria THC, which has a minority population of approximately 81 percent. Alternative O is parallel to and adjacent to Airport Road. Minority populations of approximately 84 percent are located north of Airport Road from Constellation east to Camino De Los Lopez and on the south of Airport Road from Fairly Road east to Cerrillos Road. The Tierra Contenta neighborhood located south of Jaguar Drive in the ETZ zone is approximately 74 percent minority population. Alternative S passes along its western side but not through the neighborhood.

3.4.2 Low Income Populations

Two different measures of federal poverty are used: the poverty threshold and the poverty guideline. The poverty threshold is updated each year by the Census Bureau and has separate figures for aged and non-aged one-person and two-person units. The threshold is used mainly for statistical purposes. The poverty guideline is issued each year in the Federal Register by the Department of Health and Human Services (HHS). The guidelines are used to determine eligibility for federal programs such as Head Start, the Food Stamp Program, National School Lunch Program and Low-Income Home Energy Assistance Program. The

Census poverty threshold for a family of three in 1999 was $13,290 and for a family of four $17,029. The 2000 HHS Poverty guideline for a family of three was $14,150 and for a family of four $ 17,050 (Santa Fe Community Services Web site). The measure for poverty status is based upon income and a measure of need. If the total family income is less than the guideline appropriate for that family, the family is in poverty.

Approximately 8 percent of the population in the City and County of Santa Fe is estimated to be below the federal poverty level. Table 3-26 shows the Census Tract data for low-income populations in the southwest community area. Alternatives A and F cross through the village of Agua Fria. Approximately 28 percent of the population in the village is estimated to be below the federal poverty level, which is 3.5 times greater than the city or county average. The area defined above for minority population along Airport Road has a poverty level of 15 to 17 percent, which is 2.0 times greater than the city or county average.

For the last several decades, Santa Fe's housing prices and cost of living have soared, threatening the ability of many moderate and low-income families to afford homes. In 1990, approximately 54 percent of households were paying over 25 percent of their income for housing and 26 percent of households were paying over 30 percent of their income for housing. Between 1990 and 1995, the average price for a home had gone up 50 percent while household income had only gone up 27 percent. Approximately 75 percent of the wage earners in Santa Fe County could not afford a home.

Table 3-25. Ethnic and Minority Population

Tract	Block Group	Total Population	Hispanic or Latino	Non Hispanic or Latino	White Alone	Black or African	American Indian	Asian	Native Hawaiian	Other Race	Percent Minority Population
11.06	1	2,694	1,672	1,022	922	12	36	20	0	3	65
12.01	1	2,048	1,685	363	291	13	26	0	1	0	84
12.01	2	2,545	1,912	633	549	10	27	6	2	1	77
12.01	3	4,940	4,021	919	768	19	68	18	7	1	84
12.02	2	3,007	2,334	673	544	18	67	11	1	5	81
12.03	2	1,005	549	456	427	4	13	3	2	0	57
13	1	1,409	716	693	598	8	28	30	1	2	56
13	2	3,269	2,546	723	537	30	69	68	0	1	83
13	3	2,631	1,896	735	583	18	29	60	3	0	76
13	4	902	678	224	195	6	13	2	1	0	78
103.02	1	587	323	264	236	1	10	6	0	2	58
103.4	1	868	214	654	617	0	11	16	0	1	28
103.04	2	122	92	30	27	0	0	1	0	0	76
103.04	3	1,463	1,036	427	390	1	14	2	1	1	72
106	1	1,292	667	625	585	4	12	1	0	2	53
Agua Fria		1,444	1,109	335	295	7	19	3	1	4	79
City Santa Fe		61,805	29,367	32,438	29,491	331	1,109	545	14	66	51
County Santa Fe		129,292	63,461	65,831	58,761	788	3,333	878	65	252	53

US Census Bureau, 2000 Community Group Block Data.

Table 3-26. Low-Income Populations

Tract	Total Population	Average Household Size	Household Income less than $15,000	Household Income $15,000-$20,000	Household Income $20,000-$40,000	Household Income $40,000-$50,000	Household Income $50,000-$75,000	Household Income $Greater $75,000	Median Household Income	Percent Below Poverty Level
11.06	2,581	2.36	157	31	378	111	201	162	38,175	9
12.01	9,528	3.06	451	234	1,202	369	559	292	34,743	15
12.02	3,962	2.67	362	137	570	97	212	129	27,438	21
12.03	2,425	2.92	135	60	232	55	178	127	37,188	23
13	8,183	2.93	556	176	895	303	401	443	33,967	17
103.02	4,473	2.26	150	47	344	276	462	740	59,114	5
103.04	2,431	2.67	123	56	298	92	121	345	41,660	6
106	6,280	2.49	210	68	503	262	680	810	56,169	7
Agua Fria	1,580	2.84	147	56	192	21	175	76	32,978	28
City Santa Fe	61,805		4,221	1,696	7,684	2,700	5,123	6,069	40,392	8
County Santa Fe	129,292		7,944	2,925	13,890	5,455	9,672	12,595	42,207	8

US Census Bureau, 1999 Census Tract Data

The Housing Services Division (HSD) manages the Section 8 and Public Housing programs for Santa Fe County. The HSD was created in November 1972 and remains the largest landlord in the county with 221 public housing units and 240 Section 8 units. The Section 8 program enables qualified families to seek their own housing in the private market. A family pays 30 percent of their annual adjusted income toward an established rent, and HSD pays the difference. The waiting period for this program averages 12 to 18 months. The HSD has two housing areas in Santa Fe, the Camino de Jacobo housing neighborhood with 69 units located off Airport Road and the Valle Vista Housing neighborhood with 100 units off SR 14.

3.4.2.1 Opportunities for Minority and Low-income Public Participation in the Process

Initially, two scoping meetings were held in late May 2003. Due to issues raised by the members of the Agua Fria community, five additional scoping meetings were held between June to August as shown in Table 4.

Table 3-27. Scoping Meetings

Date, Time	Location	Address	Public Attendees
May 22, 2003 2:00 – 4:00 pm	Santa Fe Courtyard Marriott	3347 Cerrillos Road, Santa Fe, NM 87505	24
May 22, 2003 7:00 – 9:00 pm	Santa Fe Courtyard Marriott	3347 Cerrillos Road, Santa Fe, NM 87505	
June 26, 2003 7:00 – 9:00 pm	Agua Fria Elementary School	3160 Agua Fria Street, Santa Fe, NM 87501	21
July 29, 2003 7:00 – 9:00 pm	Agua Fria Elementary School	3160 Agua Fria Street, Santa Fe, NM 87501	79
August 19, 2003 7:00 – 9:00 pm	Agua Fria Elementary School	3160 Agua Fria Street, Santa Fe, NM 87501	68
August 20, 2003 7:00 – 9:00 pm	The Inn at Sunrise Springs	242 Los Pinos Road, Santa Fe, NM 87507	21
August 21, 2003 7:00 – 9:00 pm	Genoveva Chavez Community Center	3221 Rodeo Road, Santa Fe, NM 87507	24

Advertisements for scoping meetings were published in the *Albuquerque Journal North, Santa Fe New Mexican,* and *Santa Fe Reporter* newspapers. The advertisements for the three August scoping meetings were published in the *Santa Fe Reporter* on Wednesday, August 13, 2003 and Wednesday, August 20, 2003. The *Albuquerque Journal North* published the ad on Thursday, August 14, 2003 and Monday, August 18, 2003. The *Santa Fe New Mexican* ran the ad on Thursday, August 14, 2003 and Monday, August 18, 2003. The newspaper circulation for the respective publications is as follows:

- *Albuquerque Journal North:* 15,500 papers / week
- *Santa Fe New Mexican*: 25,000 papers / week
- *Santa Fe Reporter:* 20,000 papers / week

Notification flyers for the August scoping meetings were placed at mailbox groups along Agua Fria Road and at commercial businesses in the area. Notifications were also placed in the San Isidro church bulletins in Agua Fria and at the facilities where the scoping meetings were held. PNM and BLM also included information about the project and the scoping meeting dates on their respective websites. PSA and talk show interviews regarding the project were also made on a local Hispanic radio station, KSWV 810AM.

The following issues were identified during the scoping process:

- Public representation in the NEPA process
- Historic values inherent to a three-hundred-year-old community
- Environmental and health effects from electric and magnetic field, noise, and visual impacts
- Violation of county ordinance for buried line unless a variance is issued
- Construction impacts from dust, noise, transport of large poles, vibration, and water quality

Alternative A and F cross through the Traditional Historic Community (THC) of Agua Fria. The Agua Fria Village Planning Committee proposed alternative L that would avoid the THC. The Santa Fe Land Use Department planning staff worked with the Agua Fria utility sub-committee and PNM to address this alternative and the issues associated with the NM 599 Scenic Corridor Ordinance. This alternative was modified by PNM and is considered in the EA as Alternative S. Three other local residents proposed alternatives M, N and R that would avoid the THC using existing or new industrial and commercial settings. Alternative M was screened out because of its similarity to Alternative O that is retained for analysis. Alternatives N and R were screened out as they did not meet the purpose and need of the project.

3.4.2.2 Community Background and Concerns

Agua Fria is recognized in Santa Fe County as both a Traditional Community as well as a Traditional Historic Community. The traditional community recognizes the long history of family settlement, pattern of land use, and presence of historic structures. The historic designation provides protection for annexation by a municipality. This allows the community to preserve the lifestyle and mix of land uses and residential densities.

An article in the *Santa Fe Reporter,* July 30, 2003, reflects some of the historical concerns expressed by members of the community: (Frosh, Santa Fe Reporter, 2003)

- Santa Fe River water used to irrigate Agua Fria crops was redirected to meet the increasing domestic needs of city residents. The diversion caused the acequias to dry up which led to a decline in the agriculture base of the community.
- Explosive growth in the southwest sector of Santa Fe has resulted in an urbanized development and the community was frequently left out of the planning decisions or under-represented.
- Unclear boundaries between the city and county created haphazard and piecemeal growth around Agua Fria, turning the area into a virtual jigsaw puzzle as evidenced by Vista Aurora and Atocha mobile-home park.
- Complex zoning has allowed light industry to encroach upon the Village.

The Southwest Community Plan initiated through Santa Fe City Council resolution 1999-71 passed July 14, 1999. The City/Council Planning Initiative Final Report evaluated the strengths and concerns of the area (Spears Architects and Western Network, 2001). The following concerns were noted.

- The speed at which urbanization is occurring is unplanned, and there is a lack of coherence and quality in what is being built. Residents were not involved in the planning process. Regulatory environment was perceived to be weak. Current zoning is very permissive and there are inconsistencies and conflicts among the various entities with jurisdiction in the area.
- Residents along Airport Road expressed concern for the expansion of commercial businesses that concentrate regional development instead of neighborhood-serving retail in the poorer areas of the community. The growth of large commercial developments is viewed as a discriminatory policy, in spite of long-standing promises that such development would not be permitted.

The traditional Village of Agua Fria officially began a community planning process with the adoption of Resolution No. 2003-82 passed by the Santa Fe Board of County Commissioners on June 10, 2003. A planning committee with three sub-committees (Boundaries, Utilities, and Community Assessment) was formed to develop a community plan. The utilities committee through nine key meetings recommended a preferred option and secondary option for PNM to consider.

Agua Fria's preferred option is Alternative L (currently Alternative S) proposed by the Planning Committee. It involves rebuild the AN line 5.2 miles; double circuiting the NZ line 1.0 miles; building a new 115 kV line 12.7 miles; rebuilding the SL lines 3.8 miles; and building two new stations in the industrial area of the Redevelopment District and outside of any existing traditional historic community. The committee supports the decisions of other communities and neighborhoods in regard to proposed line placements in their communities.

The secondary option is Alternative A, the Norton to Zia alternative with the following considerations: that no future substation or switching station be located within the Agua Fria THC and that a switching station not be placed in the immediate vicinity of Agua Fria THC. The immediate area includes, but is not limited to, the area between Cerrillos Road and Rufina Street.

3.4.3 Environmental Consequences

The population center in respect to alternatives A, F, O and S is located in the urban area of southwest Santa Fe and in the 5 mile ETZ boundary around the urban area. The portion of the transmission routes on BLM public land, state land and the county rural area would not affect any community; therefore, no adverse or disproportionate impact to minority or low-income populations would occur in these jurisdictions.

3.4.3.1 No Action

Under the No Action alternative, existing lines would be maintained in their present locations. No existing transmission lines would be rebuilt, no retrofit to existing switching stations would occur and no new line segment or new switching station would be built. Therefore the operation of the electric system to the Zia Switching Station

would remain the same, affecting all populations equally, and there would be no disproportionate effect to minority or low-income populations.

3.4.3.2 Alternative A

Alternative A is an existing line that would be double-circuited through the minority and low-income area of Agua Fria. No new line would be constructed, but the construction required for new structures may result in short-term impacts to nearby residents from noise. The new structures are taller and would be spaced further apart. For some residents the new single-pole transmission line may be less of a visual contrast than the existing double-pole configuration. The double-circuit could provide a positive effect in the reduction of electromagnetic fields.

The current land use in Agua Fria is a pattern of long narrow strips of land ownership running north and south. The majority of residents next to the existing transmission line are located in one area along Agua Fria Road. The minority population in Agua Fria is higher than in the southwest planning area but slightly less than the urban neighborhoods along Airport Road. The area also has the greatest percentage of low-income population. Because this alternative is along an existing corridor there would be no change in land use that would adversely affect the minority population. The alternative could provide a beneficial health affect. Therefore, this alternative would not be considered adverse or disproportionate to minority or low-income populations.

One of the goals of the 1999 City of Santa Fe General Plan is to preserve the historical appearance of neighborhoods. While underground electrical service is desirable from an aesthetic standpoint, it remains expensive due to many factors, such as higher maintenance costs, decreased reliability and increased labor costs. Overhead reconstruction would require a variance from the City code.

3.4.3.3 Alternative F

The effects of alternative F are similar to those described for Alternative A for short-term and long term impacts associated with construction of the transmission line. These impacts are not considered adverse or disproportionate for the reasons describe above.

Construction of a switching station in Agua Fria is considered both adverse and disproportionate to minority and low-income populations in the THC of Agua Fria. The presence of the switching station would be a sharp contrast to the criteria for which the community was designated as both a traditional and traditional historic community. Impacts associated with the switching station for noise, visual contrast, and change in land use would adversely impact the present way of life and sense of feeling for residents in the historic community. The siting of a switching station in a residential community would be disproportionate if the impact could be avoided by locating the switching station in an existing utility corridor or commercially zoned area that would meet purpose and need.

3.4.3.4 Alternative O

Airport Road has a diverse mix of land use on the north and south side of the road ranging from undeveloped land, low to moderate residential density single family homes, high residential density trailer parks and commercial businesses. The new line segment is adjacent to Airport Road and does not cross through any of the residential areas except

for the similar style housing area along Jemez. The overhead transmission line would not bisect or cause any separation of the community.

The residential areas along Airport Road are composed of a Hispanic and low-income population greater than the city and county populations but within the averages found in the southwest planning area. The transmission line would follow existing right-of-way along Airport Road and would have not have an adverse impact to land use in the existing neighborhoods.

3.4.3.5 Alternative S

Alternative S would require construction of a new line segment and right-of-way acquisition through either rural zoned county land or land in the ETZ that avoids the populated urban areas. The alignment lies along the west side the Tierra Contenta neighborhood but does not cut through this or any other existing neighborhood. Therefore no adverse or disproportionate impact would occur to minority or low-income populations for this alternative.

3.5 Visual Resources

3.5.1 Methodology

The project alternative routes are located within areas of rural, undeveloped lands, scattered rural residential use, and urban, developed areas. In order to consistently analyze visual resources in the study area, the visual resource analysis is composed of four components:

- An existing inventory of scenic quality, visual sensitivity, and distance zones through the BLM Visual Resource Management (VRM) System and existing interim visual management classes applied to BLM lands.
- Elements similar to the BLM VRM process are applied to non-BLM lands including landscape scenery, views, viewpoints, and visual sensitivity.
- A GIS visibility analysis is applied to all corridors to ensure consistency in analyzing visual contrast.
- Preparation of visual simulations.

An existing inventory of scenic quality, visual sensitivity, and distance zones using the BLM Visual Resource Management (VRM) System was previously prepared for a project in the study area (BLM, 1981). The analyses determined interim visual resource management classes for BLM lands and these are being applied to this project on BLM lands with updated information from two recent projects (Tetra Tech, Inc., 2003; BIA, 2004). Visual resource management classes identify areas on BLM land where particular attention is given to minimizing visual impacts. These elements are discussed in section 3.5.3. (BLM, 1986a).

In addition, visual sensitivity information has been identified by reviewing public input gathered for the Santa Fe County Visual Resources Inventory and Analysis (Design Workshop, 1995) and by addressing information provided during the scoping process. The county-wide visual inventory was generated based on extensive public input and computerized mapping.

3.5.2 Affected Environment

3.5.2.1 BLM Lands

The visual resource assessment process for BLM lands utilizes the BLM Visual Resource Management (VRM) System to identify scenic quality, visual sensitivity, and distance zones to determine VRM Classes (BLM, 1886a). Proposed changes to the landscape are analyzed through contrast ratings to determine if the proposed project can meet the VRM Class management objectives (BLM, 1986b). A brief discussion of each study component is included in the following section.

Scenic Quality

Scenic quality is a measure of the visual appeal of a tract of land. Lands are given an A, B, or C rating based on seven key factors: the landform, vegetation, water, color, influence of adjacent scenery, scarcity or uniqueness, and cultural modifications. Class C scenery covers the existing utility corridor locations on BLM lands.

Distance Zones

Distance zones are delineated to identify thresholds in viewing distance at which visibility is reduced. Distance zones were determined from locations such as roads and highways or other viewpoints, in this case, Buckman Road. The majority of the area is considered to be foreground/middleground (0-3 miles).

Visual Sensitivity and User Attitudes

Sensitivity is assessed by identifying the number of people viewing the area in different viewing situations or activities, the duration of a particular view, and user attitudes of changes in scenic quality. The Santa Fe County Visual Resource Inventory and Analysis has been consulted in order to provide context on non-BLM lands regarding the results of the public input from that study which identifies that the areas where the alternative corridors are located as visually sensitive (Design Workshop, 1995).

Visual Resource Management Classes

Visual resource management (VRM) classes are derived from a combination of scenic quality, sensitivity, and distance zones. They are:

- Class I: existing wilderness areas, natural areas, and areas with restricted activities.
- Class II: changes in any of the basic elements (form, line, color, texture) caused by a management activity should not be evident in the characteristic landscape.
- Class III: contrasts to the basic elements caused by a management activity are evident, but should remain subordinate to the existing landscape.
- Class IV: any contrast attracts attention and is a dominant feature of the landscape in terms of scale, but it should repeat the form, line, color, and texture of the characteristic landscape.

These classes describe and dictate the different degrees of modification allowed to the basic elements of the landscape.

The character of the project area landscape on BLM land is generally enclosed with a range of topography dominated with breaklands cut by deep arroyos. Many piñon trees have been devastated throughout northern New Mexico, including along the alternative

corridors, due to drought and ensuing bark beetle attacks. The area on BLM land from Norton Switching Station south approximately 6 miles is a utility corridor along Buckman Road. It includes Norton Switching Station and associated electric transmission lines, buried natural gas pipelines, the main Buckman well field water transmission pipeline and associated connector pipelines, several well booster stations, and buried fiber optic cables and telephone lines.

On BLM land crossed by the alternatives, the interim VRM classes are Class III and IV (BIA 2004; Tetra Tech 2003). These classes are considered interim since the BLM's official VRM assessment is not complete for this area. The area along Buckman Road for one-quarter mile on either side is designated as interim VRM Class III only for ½ mile north and south of Diablo Canyon. The remainder is designated interim VRM Class IV (Personal communication, February 10, 2004). There are no Class I areas along the project alternative corridors.

3.5.2.2 Non-BLM Lands

The character of the project area landscape on non-BLM land has a range of topography including breaklands cut by deep arroyos on the north that gives way to gently rolling terrain to the south. Piñon-juniper and intermixed grasslands form the vegetative cover. Half of the area on the southern end of the corridors is largely developed including rural residential, higher-density residential, commercial, and industrial use, along with recreation, transportation corridors and the airport.

3.5.2.3 Visual Resources by Alternative

Alternative A

Alternative A would occur entirely on an existing facility within an existing utility corridor.

BLM Lands

Landscape scenery is the same for all route alternatives on BLM land and includes piñon-juniper covered breaklands east of Canada Ancha, unpaved bladed roads, and existing transmission lines and associated access patrol trails that parallel these unpaved roads. Views along the unpaved bladed roads on BLM land are narrow and enclosed and include foreground and middleground views of utility facilities. Viewpoints on BLM land include Buckman Road.

Non-BLM Lands

On non-BLM lands, paved roads occur along the western edge of Las Campanas, also situated among piñon-juniper covered breaklands. Landscape scenery south of BLM land gives way to rolling, undulating hills then becomes smoother terrain closer to development in the Agua Fria Traditional Historic Village and Cerrillos Road. Rolling, undulating hills occur again south of Rodeo Road and southeast of Villa Linda Mall. Views begin to open near the western edge of Las Campanas with backdrop views of the Caja del Rio escarpment. Open views continue to the south, with distant mountain backdrop topography of the Sangre de Cristo Mountains to the east and northeast and the Jemez Mountains to the northwest.

Viewpoints along Alternative A on non-BLM lands include road crossings at Richards Avenue, Rodeo Road, Cerrillos Road, Rufina Road, NM-599, Agua Fria Road, Alameda Road, and Caja del Rio Road. Recreation views include those from trails and the

Municipal Recreation Complex. Views near commercial development occur along Cerrillos Road, near Villa Linda Mall and Target. Views near residential development include homes near Zia Switching Station, certain portions of Nava Ade', more sparsely sited residential locations in Agua Fria, Piñon Hills, Puesta del Sol, Town and Country neighborhoods, and on the western edge of Las Campañas. A proposed city recreation trail has been identified parallel to the existing NZ line/Alternative A alignment to take advantage of the existing north-south trending connection. Viewer sensitivity along Alternative A tends to occur where residences and recreation sites are closer to the line in foreground settings.

Alternative F

BLM Lands

Views of Alternative F transmission lines are the same as those of Alternative A.

Non-BLM Lands

Views of Alternative F transmission lines are the same as those of Alternative A, except that the lines terminate just north of Rufina Road. Alternative F includes a new switching station to be built at that termination.

Alternative O

BLM Lands

On BLM lands, Alternative O would occur on existing transmission lines. Landscape scenery is the same for all route alternatives on BLM land; see section 3.5.2.1.

Non-BLM Lands

Landscape scenery on non-BLM lands of Alternative O includes undulating, rolling terrain covered with piñon and juniper which becomes flatter and less vegetated with piñon and juniper and more mixed grassland as it approaches NM-599 and Airport Road. Rolling terrain occurs again south of Villa Linda Mall. Views are open and backdropped by the Caja del Rio escarpment on the west, the Jemez Mountains to the northwest, the Ortiz Mountains and the Cerrillos Hills to the south and southeast, and the Sangre de Cristo Mountains to the east.

Viewpoints include road crossings at NM-599 through an industrial area, Airport Road, Cerrillos Road, and Richards Road; other viewpoints include the City Municipal Recreation Complex, residences at the Vista Verde Mobile Home Park, Vista Primera, residences along Airport Road, looking south from the Villa Linda Mall southern parking lot, certain portions of Nava Ade', and residences near Zia Switching Station. Viewer sensitivity for Alternative O includes the Municipal Recreation Complex, the New Mexico Department of Game and Fish facility, and residences within foreground views.

Alternative S

BLM Lands

Landscape scenery is the same for all route alternatives on BLM land (see Alternative A above).

Non-BLM Lands

Alternative S would occur partially on existing transmission lines within existing utility corridors and would also establish a new transmission corridor within a new utility corridor and a new switching station.

The landscape scenery on non-BLM land is the same as noted for Alternative O until north and west of the intersection of Airport Road and NM-599. Landscape scenery south of Airport Road along NM-599 and into the Rancho Viejo area includes undulating, rolling terrain covered with piñon and juniper and mixed grasslands. Views are open and backdropped by the Caja del Rio escarpment on the west, the Jemez Mountains to the northwest, the Ortiz Mountains and the Cerrillos Hills to the south and southeast, and the Sangre de Cristo Mountains to the east.

Viewpoints include road crossings at Airport Road, NM-599 west of I-25, I-25 north of the NM-599 interchange, North Highway 14, and Vista del Monte. Other viewpoints include the City's Municipal Recreation Complex, the access entrance to the Santa Fe Airport, IAIA, and certain residences along the southern portion of Rancho Viejo at Rancho Viejo Village and parts of the southern and eastern portions of Windmill Ridge near the new alternative alignment and the existing SL line. Viewer sensitivity along Alternative S includes the Municipal Recreation Complex, the New Mexico Department of Game and Fish facility, residences close to the alternative alignment, and NM-599 and I-25 crossings.

3.5.3 Environmental Consequences

3.5.3.1 Visual Impact Assessment

Methodology

Visual impacts have been determined in a consistent manner that acknowledges BLM VRM contrast and visibility on undeveloped, rural BLM lands as well as contrast from developing rural residential lands and developed urban areas off of BLM land. This has been accomplished by developing visibility mapping which identifies where portions of all four alternatives could be visible or not visible from certain vantage points. Levels of contrast (strong, moderate to strong, moderate, or weak) have been assigned to each alternative alignment based on the number or acres within foreground views and middleground views, the number of residences within foreground views and middleground views, and whether the alternative would meet the BLM VRM objectives.

The GIS visibility analysis was created for this project using terrain mapping generated from aerial Light Detection and Ranging (LIDAR) instrumentation which was acquired from the Santa Fe County GIS Department. The source information was provided at 2-foot resolution for the regional area of the project alternatives. The data was re-sampled to 5-foot resolution in GIS to allow faster calculation of viewable area.

The GIS visibility analysis consisted of several steps. First, maximum structure height information for the proposed facilities was obtained, coupled with the location of each structure. The visibility process consisted of calculating what areas can be seen from the maximum height of the proposed structures under each alternative in GIS within two distance zones:

1) one quarter-mile, representing foreground views, and

2) one-mile, representing middle ground views to the proposed structures.

The next step of the analysis included an inventory of all building structures falling within residential land use types designated by Santa Fe County for the regional area. The area viewable from the alternatives was intersected against the residential structures

to yield a number of residential structures viewable from the alternatives for the two distance zones.

Structural contrast was determined for segments of the alternatives. Contrast was equated and designated to the area and number of structures seen based upon the following assumptions:

- Weak Contrast – Determined to coincide with rebuild or double-circuit of existing structures where an existing structure was replaced with a new one.
- Moderate Contrast – Coinciding with the section of new transmission line along Airport Road, where an existing distribution line would be replaced with a taller transmission structure with distribution underbuild.
- Moderate to Strong Contrast – Designated to portions of new single-pole line under alternatives O and S, in areas of wholly new transmission corridor.
- Strong Contrast – Designated to the sites where new switching station facilities would be located under alternatives F and S.

The Project Power visual simulations were created to show what the proposed facilities could look like from certain viewpoints (see Appendix B, Photo Simulations). First, views illustrating the existing conditions are shown, then photo simulations illustrating potential changes follow afterward. The process utilized GIS software to identify the camera viewpoint as well as the location of the proposed facility; then three-dimensional features such as transmission line structures were modeled in AutoCad. These models were then imported into 3-D Studio Max, where the models were rendered against the photographic image. Reasonable efforts to provide an accurate visual simulation have been made; however, the computer-generated renderings should be considered an approximate representation of how the proposed facilities might appear. Key viewpoints for the visual simulations were selected based on a variety of factors, such as accessibility, sensitivity, number of viewers, representative views, the potential for change, and other considerations.

Mitigating elements have already been incorporated into the design of each alternative, including avoiding land use constraints, sensitive areas, and visually sensitive locations as much as possible; maximizing the use of existing rights-of-way in certain alternatives; making changes in structure design such as narrower profiles and self-rusting steel for the double-circuit sections; using non-specular (non-reflective) conductor; and screening.

Visual Contrast of Alternatives

Based on the results of the visibility mapping, contrast levels for all alternatives are shown in Table 3-28. Visual contrast refers to the differences in size, shape, and color between an introduced project component and existing landscape elements. Analyzing the visual contrast of the alternatives determines potential visual impacts.

The physical contrast resulting from the proposed project is assessed by determining visual changes in existing landscape features. Levels of physical contrast for each feature would be based on the degree to which the form, line, color, and texture of landforms, vegetation, or structures would be altered and the degree that these changes may be visually apparent from sensitive viewpoints in terms of distance, duration, and viewer orientation. For the proposed project, the emphasis was placed on structure contrast. The

degree of change is categorized as either strong, moderate to strong, moderate or weak. The following project components were assigned the following contrast levels:

Table 3-28. Visual Contrast Levels

Activity	Contrast Level	Alternative	
		BLM	Non-BLM
Rebuild existing transmission line (AN or SL line)	Weak	All	A, F
Double-circuit from H-frame to single-pole structure configuration (NZ line)	Weak	A, F	A, F
Rebuild existing distribution line (along Airport Road)	Moderate	None	O
New transmission line	Moderate-strong	None	O, S
New switching stations (Zia South or Zia North)	Strong	None	F, S
Changes at existing switching station (Zia)	Weak	None	A, O, S

No Action

No change in visual resources would occur with the No Action alternative.

Alternative A

BLM Lands

The changes on BLM land would be compatible with the BLM interim VRM classes III and IV. Alternative A utilizes an existing transmission facility and existing access patrol trails within an existing utility corridor. The contrast associated with changes from rebuilding the existing line may be noticeable but would be weak, not dominant.

Non-BLM Lands

The contrast associated with double-circuiting portions of the existing line would also be weak, resulting in a narrower structure profile with fewer structures. Contrast from changes at Zia Switching Station would be weak, as the retrofitting equipment would be located within the property boundary and is not anticipated to be visually significant.

Alternative F

BLM Lands

The changes on BLM land would be compatible with the BLM interim VRM classes III and IV. Alternative F also utilizes an existing transmission facility and existing access patrol trails within an existing utility corridor. The contrast associated with changes from rebuilding the existing line may be noticeable but would be weak, not dominant.

Non-BLM Lands

The contrast associated with double-circuiting portions of the existing line would also be weak, resulting in a narrower structure profile with fewer structures. However, contrast

from Zia North Switching Station would result in strong visual contrast from residences in the Agua Fria THC.

Alternative O

BLM Lands

The changes on BLM land would be compatible with the BLM interim VRM classes III and IV. Alternative O also utilizes portions of an existing transmission facility and existing access patrol trails within an existing utility corridor on BLM lands. The contrast associated with changes from rebuilding the existing AN line may be noticeable but would be weak contrast, not dominant.

Non-BLM Lands

Alternative O would establish six miles of new transmission line and utility corridor. The contrast associated with changes from rebuilding the existing AN line may be noticeable but would be weak contrast, not dominant; however, the establishment of new transmission results in contrast ranging from moderate to moderate-strong from foreground and middleground views. Contrast from changes at Zia Switching Station would be weak, as the retrofitting equipment would be located within the property boundary and is not anticipated to be visually significant.

Alternative S

BLM Lands

The changes on BLM land would be compatible with the BLM interim VRM classes III and IV. Alternative S also utilizes portions of an existing transmission facility and existing access patrol trails within an existing utility corridor. The contrast associated with changes from rebuilding the existing AN line may be noticeable but would be weak contrast, not dominant.

Non-BLM Land

Alternative S would establish 13.6 miles of new transmission line and utility corridor and the new Zia South Switching Station. The contrast associated with changes from rebuilding the existing AN and SL lines may be noticeable but would be weak contrast, not dominant; however, the establishment of new transmission would result in moderate-strong contrast from a significant portion of foreground and middleground views. Contrast from Zia South Switching Station would result in strong visual contrast from residences nearby; however, it would be located in a relatively undeveloped area. Contrast from changes at Zia Switching Station would be weak, as the retrofitting equipment would be located within the property boundary and is not anticipated to be visually significant.

3.6 Cultural Resources

3.6.1 Affected Environment

Section 106 of the National Historic Preservation Act (NHPA) requires that the possible effects of federal undertakings on properties included in or eligible for the National Register of Historic Places (NRHP) be considered. The cultural resources inventory for this project considered archaeological and historic sites along the alternative alignments that are eligible or potentially eligible for inclusion on the NRHP.

In addition, because there are potential Native American Traditional Cultural Properties (TCPs) present near the alternative alignments, the BLM conducted a Native American consultation to determine the existing conditions of these TCPs.

The following sections describe the results of these cultural resource inventory activities.

3.6.1.1 Archaeological Sites

An archaeological inventory was performed by the LopezGarcia Group in September and October 2002 on portions of transmission line alignments AN, NZ, and ZB, and their associated access roads, an area totaling approximately 667 acres. This inventory covered the areas traversed by Alternatives A and F, including access roads (as well as Alternative E, which was eliminated during the scoping process). Transmission line survey corridors were 200 feet in width with the exception of specific areas where two transmission lines paralleled each other, at which point the survey corridors were 300 feet in width. The areas surveyed encompassed all proposed project facilities.

During the course of the field work, two previously recorded archaeological sites and eight previously unrecorded sites were encountered and recorded on the A and F alternative alignments. Nineteen isolated occurrences were found on the project alignments during this survey. Isolated occurrences refer to individual artifacts or small locations of human activity, which do not meet the minimum definitions of an archaeological site.

The LopezGarcia Group performed another inventory in January and February 2004 to study the areas covered by Alternatives O and S. Transmission corridors surveyed were 500 feet wide. The area between Airport Road and Camino Entrada was not surveyed because the ground surface has been extensively modified by modern development, including roads, parking lots, and residences. This survey found three archaeological sites and twelve isolated occurrences within the project corridors.

The archaeological sites are discussed below, by segment, and the description of each site includes the period of archaeological study each site has been identified to. Table 3-29 provides a description of these time periods.

Cultural History

The following table summarizes the periods of archaeological study referred to in the site descriptions, tracing back through the history of New Mexico.

Table 3-29. Periods of Archaeological Study

Period	Dates (approx.)	Description
PREHISTORIC PERIODS		
Paleoindian Period	10,000 to 5500 B.C.	Small, nomadic bands of hunter-gatherers of Asian origin inhabited the Southwest. Wetter environment in region with floral grasslands and forest. Rare Paleoindian sites are identified by distinctive tool types, including points, scrapers, and knives.
Archaic Period (including Cochise Tradition and Oshara Tradition)	5500 B.C. to A.D. 400	Paleoindian groups adapted to changing environment, including drier climate, shift to modern animal species, and shrinking of grasslands. Populations became mobile. Stone tools became more diverse. Remains characterized by rock shelters, caves, chipped and ground stone, fire-cracked rock, and isolated artifacts.
Early Archaic	5500 to 3200 B.C.	Camps, hunting camps, and quarry workshops developed.
Middle Archaic	3200 to 1800 B.C.	Base and hunting camps, more complex tools. Greater availability of water.
Late Archaic	1800 B.C. to A.D. 600	Shift to more complex social organization and higher population.
FORMATIVE TO HISTORIC PERIODS	*(Two different regional Formative to Historic period classifications cover the same time periods: the Pecos and Rio Grande. Both are listed here)*	
Pecos Classification		
Basketmaker III (Early Developmental)	A.D. 500 to 700	Bow and arrow developed, beginnings of village life
Pueblo I (Mid-Developmental)	A.D. 700 to 900	Village life, farming, increase in population. Below normal rainfall.
Pueblo II (Mid-Late Developmental)	A.D. 900 to 1100	Increasing populations, increasing village sizes, aboveground architecture. Dependence on agriculture and wild game. Cooler and moister climate.
Pueblo III (Late Developmental to Early Coalition)	A.D. 1100 to 1300	Very low levels of rainfall began to cause abandonment of region.
Pueblo IV (Late Coalition to Classic)	A.D. 1300 to 1600	Very unfavorable dry climate causes large portions of population to retreat to previously unoccupied, more moist areas.
Northern Rio Grande Classification		
Developmental	A.D. 400 to 1200	Increased reliance on agriculture, more villages. Increase in site density in the region.
Coalition	A.D. 1200 to 1325	Substantial increase in population. Increase in number of sites; residences move toward communities. Sites concentrated near major drainages. Architectural style shifts from below ground to above ground structures of up to 200 rooms. Includes Anasazi activity.
Classic	A.D. 1325 to 1540	Widespread cultural changes in region, including dramatic population increase and gathering into multi-storied large pueblos. Expansion of Anasazi populations into upland settings. In middle Classic period, population reduced, probably due to climate changes.

Period	Dates (approx.)	Description
HISTORIC PERIODS		
Spanish Exploration	A.D. 1540 to 1598	Coronado's arrival in Albuquerque area marks beginning of Historic period. Area population concentrated in several large pueblos.
Spanish Colonization – Pueblo Revolt	A.D. 1598 to 1680	Beginning of permanent presence of Europeans in present-day New Mexico. Forced labor, religious conversions, domesticated livestock, new plant species, restricted access to traditional use areas resulted in severe disruption of traditional native practices. Establishment of irrigation system along floodplain of Rio Grande expanded settlement. Missions established, and pueblos occupied. Rebellion by native populations expelled Spanish from New Mexico.
Spanish Colonial	A.D. 1692 to 1821	Spanish rule reestablished in region. More extensive settlement, land grant system established, and presidio system introduced. Throughout 18th century, New Mexico was isolated from outside world, other than through interior of Mexico.
Mexican	A.D. 1821 to 1846	Mexico's independence from Spain in 1821 marks beginning of Mexican period in region. Trade and social contact between New Mexico and U.S. increases via Santa Fe trail.
U.S. Territorial	1846 to 1912	New Mexican Colony acquired by U.S. in 1846. Increase in trade networks with eastern U.S., institution of wage economy, large increase in homesteading, and the coming of the railroad characterize this period.
Statehood	1912 to Present	Statehood granted in 1912, resulting in political changes. Economic trends from Territorial period continue. U.S. Route 66 built through New Mexico, with high economic impact.

Sites on BLM Land: AN1 Segment (Alternatives A, F, O, and S)

Five archaeological sites and 12 isolated occurrences were found in the AN1 segment, which is located on BLM land and is common to Alternatives A, F, O, and S.

1. **Description of site:** Site number LA128580, structural components of a rail line; disturbed
   Period: Historic
   NRHP eligibility: recommended not eligible for inclusion

2. **Description of site:** Site number LA137515, lithic artifact scatter; disturbed by road and structure site
   Period: Prehistoric (similar to other sites from Late Archaic period)
   NRHP eligibility: recommended eligible for inclusion under criterion D

3. **Description of site:** Site number LA137517, sparse, dispersed scattering of rock and ash stain with datable deposits located in the two-track right-of-way road along the transmission line.
   Period: Prehistoric, most likely from Late Archaic period
   NRHP eligibility: recommended eligible for inclusion under criterion D

4. **Description of site:** Site number LA137522, sparse, dispersed scattering of rock artifacts, containing datable fire-cracked rock; site is crossed by right-of-way

access road for transmission line
Period: likely Late Archaic
NRHP eligibility: recommended eligible for inclusion under criterion D

5. **Description of site:** Site number LA137518, scattering of artifacts and fire-cracked rock
Period: Prehistoric
NRHP eligibility: recommended as eligible for inclusion under criterion D

Alternative A Sites

Alternative A contains all of the sites described above found on BLM land, as well as the following sites.

NZ1 Segment (Alternatives A and F)

Four sites were found in the NZ1 segment, which is common to alternatives A and F.

1. **Description of site:** Site number LA88152, previously discovered site consisting of dispersed scattering of stone point fragment artifacts
Period: Prehistoric
NRHP eligibility: determined to be ineligible for inclusion, both in 1992 and during the 2003 inventory.

2. **Description of site:** Site number LA137511, small, sparse scattering of stone points and ceramic artifacts
Period: Anasazi era (A.D. 1250-1350)
NRHP eligibility: recommended as eligible for inclusion under criterion D

3. **Description of site:** Site number LA137523, dispersed scattering of artifacts
Period: Historic
NRHP eligibility: recommended as not eligible for inclusion

4. **Description of site:** Site number LA137513, moderate density dispersed scatter of artifacts, including ceramics, stone points, and fire-cracked rocks.
Period: Early Anasazi (based on ceramic types)
NRHP eligibility: recommended as eligible for inclusion under criterion D

NZ2 Segment (Alternative A)

The NZ2 segment, which is on the Alternative A alignment only, contains two sites.

1. **Description of site:** Site number LA137510, concentration of historic artifacts associated with irrigation ditches, a concrete siphon, and two outbuildings.
Period: recent Historic
NRHP eligibility: recommended as eligible for inclusion under criteria A and D

2. **Description of site:** Site number LA137512, disturbed site with dispersed artifact scatter and irrigation feature
Period: Historic, dating from Territorial through Statehood period
NRHP eligibility: recommended as eligible for inclusion under criteria A and D

Alternative F Sites

The Alternative F alignment contains the sites described above from BLM land (AN1) plus the NZ1 sites.

Alternative O Sites

The Alternative O alignment contains the sites listed above on BLM land, plus one additional site.

Description of site: Site number LA125553, aboriginal artifact scatter
Period: middle to late Archaic
NRHP eligibility: recommended as eligible for inclusion

Alternative S Sites

The Alternative S alignment contains the sites listed above on BLM land, plus two additional sites.

- **Description of site:** Site number LA191, structural site with artifact scatter; located within the PNM right-of-way but access road has been designed to skirt around the site.
  Period: Prehistoric, Pueblo, Development to Coalition period
  NRHP eligibility: recommended as eligible for inclusion

- **Description of site:** Site number LA142741, trash scatter with associated possible old roadbed
  Period: Historic
  NRHP eligibility: recommended as not eligible for NRHP but should be avoided until concurrence is given by the New Mexico SHPO

3.6.1.2 Native American Traditional Cultural Properties

The following contact was made with the Pueblos for Project Power.

- Pueblo Governors and Hopi Tribe were added to Project Power mailing list in April 2003.
- Invitation letters were sent to the following Pueblos and tribes for attendance at the May 22, 2003 scoping meeting:
  - Governor, Pueblo of San Juan
  - Governor, Pueblo of Santa Clara
  - Governor, Pueblo of San Ildefonso
  - Governor, Pueblo of Nambe
  - Governor, Pueblo of Pojoaque
  - Governor, Pueblo of Tesuque
  - Governor, Pueblo of Cochiti
  - Governor, Pueblo of Santo Domingo
  - Director, Cultural Preservation Office, Hopi Tribe

- On June 18, 2003, San Juan and Santa Clara Pueblo Governors received a copy of the newsletter and info for June 26, 2003, scoping meeting.
- On June 19, 2003, Pojoaque, Nambe, and San Ildefonso Pueblo Governors received a copy of the newsletter and information for the June 26, 2003 scoping meeting. Nambe Pueblo said they were not interested nor concerned as the line did not cross any Pueblo property.
- On June 26, 2003, the Santo Domingo Pueblo Attorney and the Tesuque Pueblo Governor received information regarding the June 26, 2003, scoping meeting.

On August 19, 20, and 21, 2003, a mailing was made to all of the above Pueblos and tribes for scoping meetings.

3.6.2 Environmental Consequences

The No Action alternative would result in no change regarding cultural resources.

Archaeological and historic sites identified by survey are avoidable on all project alternatives, on both BLM and non-BLM land. As a result, all project alternatives would result in no effect to historic properties. Most of the impacts to the cultural landscape resulting from the existing lines were sustained during their construction in the 1950s. Maintenance on the lines and roads has been ongoing over the past five decades. Pole structure locations were bladed and trenches were excavated with heavy equipment for poles and anchors during construction.

If any recorded archaeological sites occur near pole structures scheduled for replacement or rebuilding, all work would occur in areas that had been previously disturbed during construction. Most of the work on and around the structures would be conducted using rubber-tired vehicles. Pulling sites for reconductoring would not be placed in archaeological sites. Archaeological monitors would be employed during all phases of construction to ensure that all construction activities are limited to previously disturbed portions of the archaeological sites.

New line construction would avoid the three sites that occur in the alignments of alternatives O and S.

3.6.2.1 Avoidance and Mitigation

All construction activities occurring within archaeological sites would be monitored by qualified archaeologists. Any features occurring adjacent to the access roads would be flagged for avoidance and monitored by an archaeologist as equipment passes through the area. Should additional features be discovered during the course of the project, appropriate agency officials would be consulted to assure that resources are treated in an approved manner.

3.7 Electric and Magnetic Fields and Noise

3.7.1 Affected Environment

3.7.1.1 Electric and Magnetic Fields

Whenever electricity flows through a wire, it creates both electric and magnetic fields. Electric and magnetic fields (EMF) are invisible lines of force that surround any electrical device including power lines. They are widespread phenomena that are found in the area immediately adjacent to electric transmission lines as well as many household

appliances including microwaves, hair dryers, and electric razors. Electric fields (measured in units of volts per meter (V/m)) are produced by voltage and increase in strength as the voltage increases. Magnetic fields (measured in units of milli-gauss (mG) near transmission lines) result from the flow of current through wires or electrical devices and increase in strength as the current increases. Electric fields cannot be seen but can sometimes be felt as a tingling at high strengths. Magnetic fields cannot be seen or felt. Electricity in North America alternates through 60 cycles per second, or 60 Hz. Additional information regarding EMF is available from the EMF Research and Public Information Dissemination (RAPID) Program web page (EMF-RAPID 2004).

Electric Field Effects

The electric field created by a high voltage transmission line exists in the region around the energized conductors. The undisturbed electric field at a height of three feet (ground level electric field) is used to describe the field near transmission lines. This quantity is easily measured and computed using the following parameters: conductor height above ground, line geometry, and line voltage. The electric field may also result in induced currents, spark discharge shocks or steady state induced shocks in conducting objects located beneath the power lines that are not grounded. Persons touching these objects may experience a shock similar to touching a doorknob after walking across a carpet. Carrying or handling conducting objects under the line can also result in spark discharges that are a nuisance.

Magnetic Field Effects

Alternating magnetic fields induce voltages at the open ends of conducting loops. Such things as a fence, an irrigation pipe, a pipeline, an electrical distribution line, or a telephone line can form the conducting loop. The earth to which one end of the conductor is grounded forms the other portion of the loop. The possibility for a shock exists if a person closes the loop at the open end by contacting both the ground and the conductor. Normally, the resistance of shoes would limit the current to levels below the threshold for perception; however, a low resistance contact (standing barefoot on damp earth) with a long insulated fence parallel to a heavily loaded transmission line can result in steady-state currents above threshold and even above let-go. These effects, while theoretically true, are associated with heavily loaded higher voltage transmission lines and have not been experienced on PNM's 115kV transmission lines.

Corona Effects

Corona is the electrical breakdown of the air near high voltage conductors into charged particles that can result in audible noise and electromagnetic interference. Corona-generated audible noise from transmission lines is generally characterized as crackling, hissing, or humming noise. The noise is most noticeable during wet conductor conditions such as rain or fog. During fair weather, audible noise may be barely perceptible as a very sporadic crackling sound. Corona on transmission line conductors can also generate noise at the frequencies at which radio and television signals are transmitted. This noise can interfere with receiving these signals and is called "radio interference" and "television interference," depending on the frequency. Radio reception in the AM broadcast band (535 to 1605 kHz) is most often affected with what is commonly referred to as static. FM radio reception is rarely affected. Corona can affect the reception of the video (picture) portion of a television signal. Television interference due to corona appears as three bands of "snow" on the television screen.

EMF Health Effects

Numerous studies have been performed to explore the possible health effects of EMF. The largest study to date was led by two US government institutions, the National Institute of Environmental Health Sciences (NIEHS) of the National Institutes of Health and the Department of Energy (DOE), with input from a wide range of public and private agencies. This evaluation, known as the Electric and Magnetic Fields Research and Public Information Dissemination (EMFRAPID) Program, was a six-year project with the goal of providing scientific evidence to determine whether exposure to power-frequency EMF involves a potential risk to human health. In 1999, at the conclusion of the EMF RAPID Program, the NIEHS reported to the US Congress that the overall scientific evidence for human health risk from EMF exposure is weak. Since 1999, several other assessments have been completed that show weak scientific support for an association between childhood leukemia and exposure to power-frequency EMF. A more detailed discussion of EMF health effects studies is provided from the EMF-RAPID web page (EMF-RAPID 2004).

There are no federal standards limiting occupational or residential exposure to 60-Hz EMF. At least six states have set standards for transmission line electric fields in terms of the line ROW; two of these also have standards for magnetic fields (see range of standards from magnetic fields in Table 3-30). In most cases, the maximum fields permitted by each state are the maximum fields that existing lines produce at maximum load-carrying conditions. For power lines, the maximum field strength for the electric field values occurs within a relatively small area of the ROW near the location where the conductors sag closest to the ground. EMF associated with transmission lines is most intense very near the conductors and falls away relatively quickly as the distance from the conductor increases.

Existing EMF in the Project Area

Computer modeling and field verification of existing EMF for comparable transmission lines was performed as a part of the EA. A full description is provided in Appendix A. PNM selected three different transmission line locations in the Santa Fe and Albuquerque areas for the comparison study. The line configurations at these sites are similar to the configurations in the Agua Fria area for both existing conditions and for proposed project alternatives. Key issues that directly affect EMF levels include: distance of the conductor from ground, phase separation, arrangement of phasing on double-circuit structures, and line loadings. Field studies were conducted on October 2 and 27, 2003, during times of normal line loading conditions.

Modeling and field measurements for existing PNM lines at three representative sites are described below and are summarized in Table 3-30 (additional information is provided in Appendix C). The modeled and field values for the magnetic fields at these sites are within the range of proposed and existing standards for edge of right-of-way (ROW) at 40 and 50 feet from centerline of the ROW. (Proposed project alternatives have 25 foot, 37.5-foot and 50-foot distances from centerline of ROW to edge of ROW). Photos of each site are provided in Appendix C.

Site 1. Comparison of EMF generated by PNM's "NZ" single circuit 115kV line just south of Agua Fria Road, Santa Fe, NM. This transmission line is a typical wood pole H-frame construction. Field measurements generally verify computer model values.

Site 2. H-frame comparison of EMF generated by PNM's PM and PW 115kV lines south of the intersection of Sage and Benavides, Albuquerque, NM. At this location, the transmission corridor is made up of two typical single circuit wood-pole H-frame structures. Field measurements generally verify computer model values.

Site 3. Double-circuit comparison of EMF generated by PNM's PM and PW 115kV lines south of the intersection of Sage and 98th, Albuquerque, NM. At this location, the transmission corridor is a steel single-pole structure that carries both circuits. This is a typical double-circuit design. At this location, phasing of the circuits is rolled. Field measurements generally verify computer model values.

Table 3-30. Comparison of Modeled and Measured Magnetic Fields (mG)

	Modeled		Field		Range of Proposed/Existing Standards of Other States for Comparison* (Not Applicable to Project)
Distance from Structure (Theoretical Edge of ROW)	40 feet	50 feet	40 feet	50 feet	
Site 1 – NZ	30.1	22.3	27.8	21.4	150 to 250 mG
Site 2 – H-frame	19.7	23.7	21.6	27.9	
Site 3 - Double circuit	1.6	1.3	2	1.8	

*Standards are for the edge of ROW

3.7.2 Environmental Consequences

3.7.2.1 Electric and Magnetic Fields

Potential electrical effects associated with transmission lines include ozone generation, radio and television interference, audible noise, electric and magnetic field interference, and safety concerns. The first three of these potential effects are caused by corona, which is the electrical breakdown of air into charged particles created by the electrical field at the surface of the conductors. Corona effects are generally associated with transmission lines operating at voltages of 345kV or above (project alternatives operate at voltages of 115kV or lower), or at higher altitudes.

Noise may be noticeable in the proposed alternatives directly under a line during foul weather such as rain. However, line noise would remain very low and would probably be masked by background storm noise such as raindrops during inclement weather. Corona effects on the modeled proposed alternatives are expected to be low enough so that no objectionable audible noise or radio or television interference would result outside the ROW. Ozone generation would be undetectable for all the alternatives.

EMF conditions were modeled for existing conditions and the proposed project alternatives (see Appendix C for all EMF modeling information). Average loading conditions are used in the analysis of impacts, although both peak and average loading conditions were calculated. Peak loading is the maximum 1-hour loading the line would experience in a year, and average loading is the 50th percentile hourly loading the line would experience in a year. EMF models show that all alternatives produce EMF levels that are significantly below any established standards in other states. The maximum EMF produced at edge of ROW under any alternative is approximately 30 mG. Standards set in other states for edge of ROW are in the range of 150 to 250 mG (see Table 1 in Appendix C).

Adverse health impacts from EMF to residents in the vicinity of transmission lines are not indicated according to available research (EMF-RAPID 2004). Numerous scientific studies have been completed regarding EMF and health issues. To date, these studies have not identified any direct cause-and-effect relationship between EMF levels and adverse health effects.

3.7.3 Avoidance and Mitigation

The proposed transmission line would be designed and constructed to meet or exceed all applicable requirements of the National Electrical Safety Code (NESC). As a routine matter, PNM would ground all fences and gates within the line ROW. In addition, PNM would investigate and correct any reported induced shocks on other fences or buildings associated with the proposed action; however, persons working near the transmission line should exercise caution not to contact the conductors with long, metallic objects (such as irrigation pipes). Such contact would produce a lethal electric shock.

Electrical equipment can be a safety hazard and special care would be taken by PNM employees and their designated contractors when working on or near transmission lines to avoid hazardous situations. Construction measures, such as grounding and breaking electrical continuity, implemented for electric field induction would reduce magnetic field induction effects. Knowledge of the phenomenon, grounding practices, and the availability of construction measures mean that magnetic induction effects from any transmission line can be minimized.

Noticeable corona effects are not expected for any of the alternatives. New lines are designed to reduce corona generation. However, if any corona effects (audible noise or radio or television interference) problems are reported, normal transmission line maintenance activities would locate and correct these problems as they occur.

3.8 Cumulative Impacts

3.8.1 Cumulative Impact Issues

The focus of this cumulative effects analysis is related to the combined impacts of Project Power alternatives and other past, present, and reasonably foreseeable future infrastructure related projects. The CEQ regulations (40 CFR 1500 – 1508) define the impacts and effects that must be addressed by federal agencies in satisfying the requirements of the NEPA process. Direct and indirect impacts are defined and described at the beginning of Chapter 3. Cumulative impacts:

- Result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions,
- Regardless of what agency (federal or non-federal) or person undertakes such other actions, and
- Can result from individually minor but collectively significant actions taking place over a period of time.
- These reasonably foreseeable future actions refer to future action projections, or estimates, of what is likely to take place when a proposed action is implemented. They are not part of the proposed action but are projections being made so that future impacts, cumulative and otherwise, can be estimated as required by NEPA.

- Cumulative effects are the total effect on at given resource or ecosystem of all actions taken or proposed (40 CFR 1508.7).

Resources expected to be affected by the proposed action and potentially result in cumulative impacts include visual, recreation experience, and traffic on Buckman Road. Additionally impacts to an Environmental Justice community (Agua Fria) have been identified.

Direct impacts on soils, water resources, vegetation, wildlife, TES species, land use, and recreation from the construction, operation and maintenance of the of the proposed Project Power transmission line alternatives A, F, O, and S would be avoided or mitigated.

On BLM lands, the visual contrast of the proposed Project Power transmission line alternatives is weak, and alternatives are compatible with BLM VRM Classes III and IV. The combination of the proposed transmission line facilities and other planned projects, such as the Buckman water facilities, are analyzed for potential cumulative impacts. The rationale for this analysis is based on the NEPA definition of cumulative impacts, which states that "cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

On non-BLM lands, the visual contrast of proposed new facilities ranges from moderate to strong, resulting in cumulative impacts in some locations. The criteria for determining cumulative visual impacts are centered on:

- Visual dominance – Influence of past, present, and foreseeable future facilities as seen in proximity to each other.
- Context of the setting – areas of undeveloped, open space areas are more susceptible to cumulative visual impacts, because of the long-term commitment of these areas to the public for recreation and aesthetic enjoyment.
- Historic Communities – The image of traditional practices, community scale and historic patterns of development and acequia systems lend historic communities to be more susceptible to cumulative visual impacts.

Issues associated with Project Power alternatives are analyzed in the context of two geographic areas: the **Buckman Road corridor** and **City of Santa Fe 5-mile Extraterritorial Zone** (see Map 3-7).

Buckman Road Corridor

The Buckman Road corridor on BLM lands is utilized by the City of Santa Fe for the Buckman well field and the water supply to Santa Fe, as well as for PNM's electric transmission system. The BLM manages the Buckman Road area as Class III and Class IV VRM in order to minimize contrast and disturbance related to water and utility infrastructure (Taos Resource Management Plan, 1988). The Buckman Road corridor provides recreation access into BLM and Forest Service lands. The Buckman 4 Supplement Wells EA, and the Buckman Water Diversion Project EIS address additional facilities planned for the area, including cumulative impacts from the proposed projects. Cumulative issues associated with the Buckman 4 Supplemental Wells EA include visual resources, water, living resources and socioeconomics.

City of Santa Fe 5-mile Extraterritorial Zone (ETZ)

Specific goals established by varying plans and policies focus on the character of the area. Santa Fe County goals are to protect natural environments, special landscapes, and highway corridors (Santa Fe Extraterritorial Zoning Ordinance, 1997). Additional goals established in the City of Santa Fe's General Plan are to maintain and respect Santa Fe's unique personality, sense of place, and character (City of Santa Fe, General Plan, 1999). Planning goals set by Santa Fe County for the ETZ involve establishing standards for preserving and protecting natural features (The Santa Fe County Growth Management Plan, General Plan, 1999).

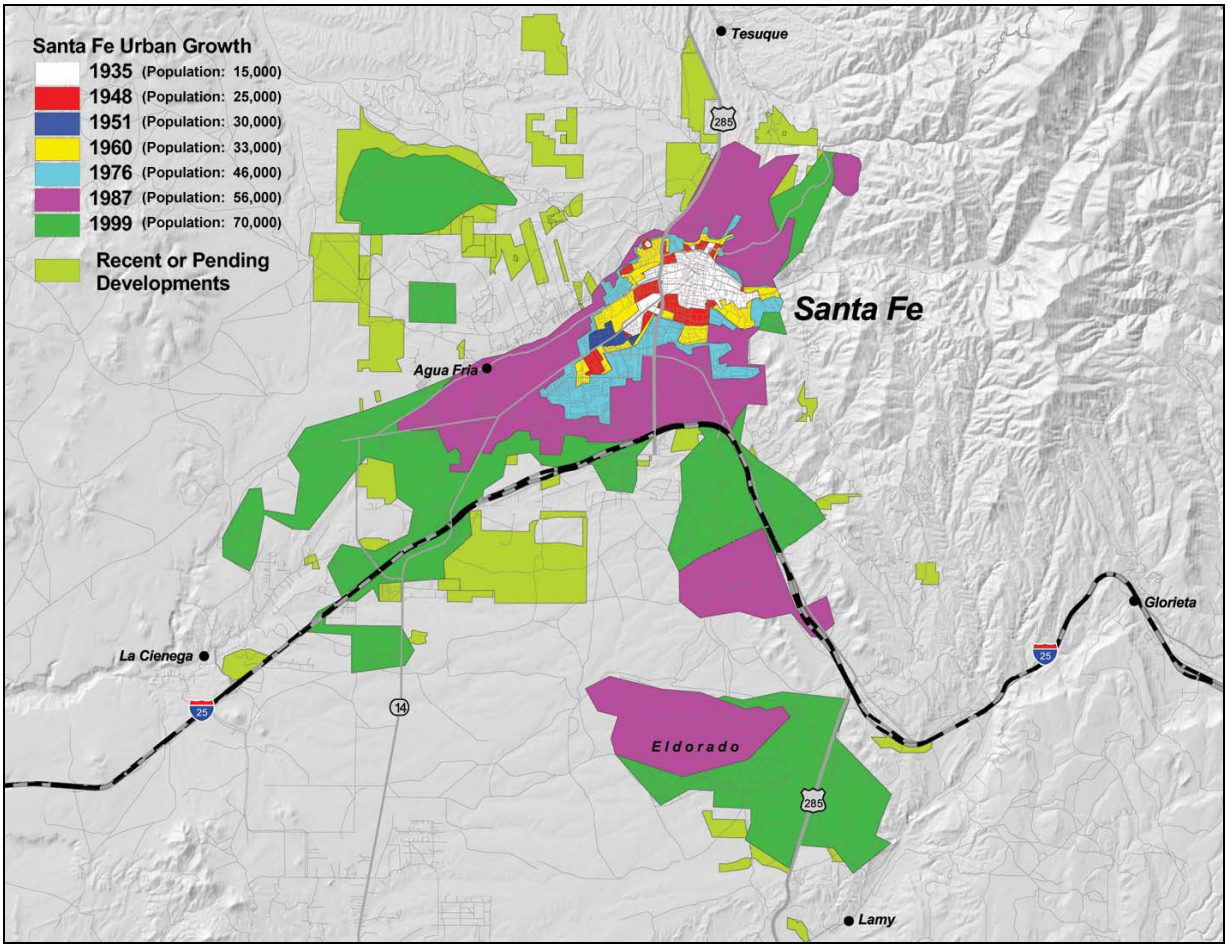
There are several planning areas within the City of Santa Fe 5-mile ETZ related to Project Power alternatives. Some of the goals for these planning areas are summarized below.

- Tres Arroyos planning area – establish trails network, retain existing low-density residential and limit night lighting.
- Municipal Recreation Complex – regional park valued for its open space and trails, golf course and ball fields (City of Santa Fe, Parks, Open Space, Trails, and Recreation Master Plan, 2001).
- Southwest planning area– valued for its rural neighborhood character (Southwest Santa Fe, Community Area Master Plan, 2002).
- Agua Fria THC – valued for its long history of family settlement, pattern of land use, and presence of historic structures.
- Community College District – goal is to protect its natural environment and open space (The Santa Fe Community College District Plan, 2000).
- 599 and I-25 Corridors – goal is to protect scenic vistas, natural landscapes of the Santa Fe area as viewed from highway (Santa Fe Metro Area, Highway Corridor Plan, 1999).

3.8.2 Past, Present, and Reasonably Foreseeable Future Projects

The map in Figure 3-1 shows growth since 1935 in the Santa Fe area, with the green areas indicating recent or planned development as of 2001. The first utility line constructed in the area was the Zia-Mejia 46kV line, built in 1928 from Albuquerque to Santa Fe. During the 1950s, the Zia Switching Station and the following transmission lines were built: SL line, AN line, NH line, RS line, NZ line, and DOE line. The Norton Switching Station was built along Buckman Road in 1977, followed by the NB line in 1982. These facilities established the electrical system currently serving Santa Fe and the surrounding region. The Buckman area has served as a source of water for the Santa Fe area since 1972.

Figure 3-1. Santa Fe Urban Growth



The zoning around the City of Santa Fe within Santa Fe County consists of a combination of rural zoning within an area around the city limits designated as the Extraterritorial Zone (ETZ).

Population growth in Santa Fe County is expected to increase by about 8 to 10 percent per year. The proposed project is not expected to change the current zoning or proposed land use.

Additional electrical capacity is needed by the winter of 2004 to provide reliable bulk power to Santa Fe. Area growth would continue to put an increased demand on the electrical system; therefore, the ability to provide reliable electric service to the area would remain at risk (see Chapter 1, Purpose and Need).

The proposed Project Power is a growth-accommodating project, not a growth-stimulating project. Growth in the area served by the existing PNM system is described in Chapter 1. Similar growth-accommodating projects are proposed in the region. One project to accommodate Santa Fe's load growth is the Norton-Hernandez Line Reconductoring Project, which is also the subject of the recently completed BIA Environmental Assessment. Although not directly related, the cumulative effects of both projects taken together would be to ensure reliable electric service to Northern New Mexico.

3.8.3 Scope of Cumulative Analysis

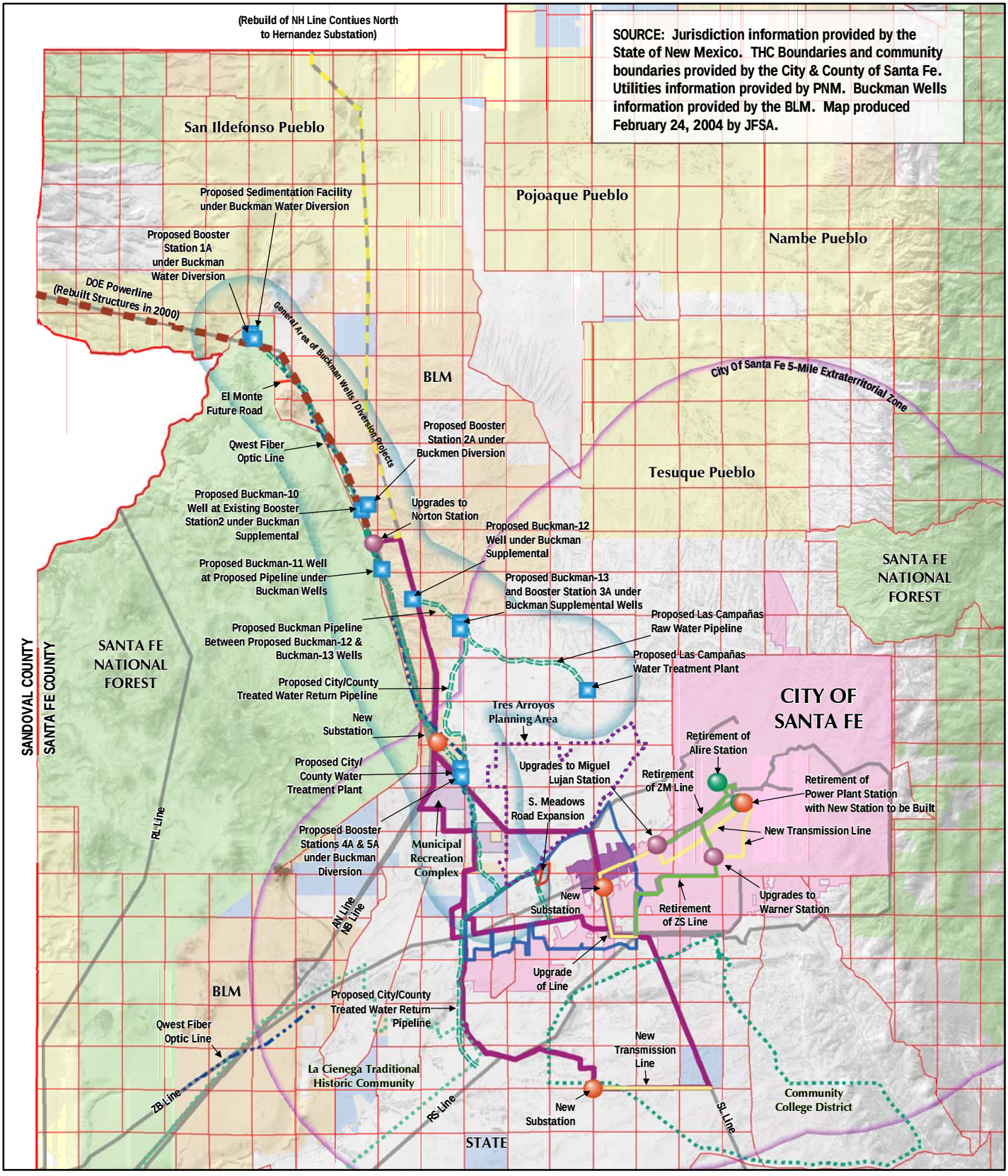
The scope of the cumulative effects analysis includes the following facilities and proposed projects within the City of Santa Fe 5-mile Extraterritorial Zone and the Buckman Road area, as shown on Map 3-7. As shown on Map 3-7 and Table 3-31, there are a number of planned projects related to future electric and water service in the Santa Fe region:

Existing Facilities

- Transmission elements of PNM's Electrical System related to the project area
- DOE Norton Los Alamos Transmission Line
- City of Santa Fe Buckman Wells System
- Qwest fiber optic line

Proposed plans and projects

- Transmission elements of PNM's 10-year plan related to the project area
- PNM Norton-Hernandez 115kV Transmission Line Reconductoring
- City of Santa Fe Supplemental Wells
- City of Santa Fe Buckman Water Diversion
- El Monte Road ROW
- South Meadows Road
- Buckman ACEC



LEGEND

PNM Primary 10-Year Plan Elements

- New PNM Station
- Retirement of Existing PNM Station
- Upgrade to Existing PNM Station
- PNM Proposed Norton-Hernandez Rebuild
- PNM Retirement of Existing Line
- New / Upgrade Corridor
- Project Power Proposed Alternatives

Existing Transmission Lines

- Other Existing PNM Transmission Lines
- DOE Powerline

BLM Related Existing & Future Projects

- Buckman Wells / Diversion Project Component
- Water Pipeline Related to Buckman Wells/Diversion
- El Monte & South Meadows Road Projects (BLM)
- Qwest Fiber Optic Line along Buckman Road (Completed)

Other Jurisdictions

- City of Santa Fe 5-Mile Extraterritorial Zone Boundary
- Agua Fria Traditional Historic Community
- Southwest Area Plan Boundary
- Municipal Recreation Complex

N W E S

0 0.5 1 1.5 Miles

SCALE - 1:200,000

Cumulative Impacts - Past, Present and Future Actions

U.S. DEPARTMENT OF THE INTERIOR BUREAU OF LAND MANAGEMENT

Map 3-7

Table 3-31. Existing, Proposed, and Planned Projects Considered

PROJECT	DATE	ISSUES / IMPACTS
El Monte Rd. RW (future road and utilities ROW – utilities off Buckman Road)	possibly 2004-06 (analysis in progress)	- visual - recreation experience - traffic/roads
Buckman Diversion (Rio Grande) - electric power for city water treatment plant - utilities and construction along Buckman Rd. Two water plants, a substation north of city landfill, distribution and pipeline construction	2005 forward (analysis in progress)	- visuals - roads/traffic
Buckman Wells development (facilities and construction and maintenance traffic)	8 - 2002 #0-13 - 2003 forward	- visual - traffic
South Meadows Road extension (new road construction)	Summer 2004 forward	- visual
PNM Norton-Hernandez Reconductoring Project	Decision pending	- visual
DOE Powerline (BLM SN NM-034574)	ROW issued in 1958	- visual
Qwest fiber optic line (BLM SN NM-57927)	ROW issued in 1985	- visual
Future Project – BLM would cooperate with Santa Fe County (/ City of Santa Fe). Santa Fe River projects (clean-up; trails and recreation development)	near future	- visual - recreation experience
BLM Future Buckman ACEC Planning study		- visual resource management - recreation experience - access

3.8.4 Geographic Scope of Analysis

As shown on Map 3-7, the geographic context in which the project alternatives are analyzed includes the **Buckman Road corridor** and **City of Santa Fe 5-mile Extraterritorial Zone**.

Lands in the vicinity of Buckman Road are publicly owned and are managed by the BLM. The Taos Resource Management Plan, dated October 1988, sets forth the land use decisions, terms and conditions for guiding and controlling future management actions on BLM public lands, including those within the project area. The proposed transmission alignments are not within any special BLM management area or right-of-way exclusion area (BLM, 1988). Utility rights-of-way for transmission lines are allowed where linear projects do not result in undesirable impacts to other public resources and values.

Zoning around the City of Santa Fe within Santa Fe County consists of a combination of rural zoning within an area around the City limits designated as the Extraterritorial Zone (ETZ). The Santa Fe County Growth Management Plan, adopted October 26, 1999; the 1980 Santa Fe County General Plan and its implementing document, the Santa Fe County Development Code, divided the urbanized areas of Santa Fe into community planning

areas. The Southwest Community Planning Area covers the location of Zia Switching Station, portions of the alternative A, F, O, and S alignments within the urban area, and the proposed Zia North Switching Station in Agua Fria (Alternative F).

Agua Fria is one of 37 traditional communities recognized in the Santa Fe County Growth Management Plan where there has been a long history of family settlement, a pattern of diverse and mixed community land use, presence of historic structures and existence of a village center. The traditional community concept was devised to recognize areas in the county that had already been settled at densities higher than allowed by the hydrologic studies in the 1980 Santa Fe County General Plan. Beginning in the 1920s, plots of land were subdivided into long, narrow parcels oriented such that a maximum number of landowner heirs could access water from the Santa Fe River and acequias.

3.8.5 Cumulative Analysis Approach

The approach to the cumulative analysis included the identification of relevant projects and the issues and impacts resulting from these projects. Identification of cumulative impacts centered on the following:

- Visual Resources – changes in the "rural or neighborhood character" of the landscape. Visual resource cumulative effects issues associated with the proposed alternatives include the visual impacts to residents and recreational users.
- Recreation Experience – closely related to the changes in the visual setting. Recreation resources cumulative effects issues include possible diminished recreational experience associated with change in visual character as seen from recreation sites.
- Transportation / traffic - increased travel on rural roads. Transportation / traffic cumulative effects issues include possible increased pressure for travel on local roads associated with the construction and operation of project alternatives.

3.8.6 Cumulative Environment and Impacts

3.8.6.1 Buckman Road Area

Existing Uses: The Buckman Road corridor is located on BLM land, northwest of the City of Santa Fe. The close proximity of public lands to the City of Santa Fe creates a high demand for rights-of-way for utilities and communications sites. Existing uses in this area include water supply and electric utilities. The Buckman well field provides water to the City of Santa Fe via wells, pipelines and ancillary facilities. Electric utilities in this area include 5 transmission lines and a substation. Most of these transmission lines were constructed in the 1950s.

Another existing use is the Qwest Fiber Optic Line, an existing telecommunications line buried parallel to Buckman Road.

Traffic data collected on Buckman Road in September 2002 by Tetra Tech just north of Dead Dog Well indicate that traffic volumes on Buckman Road vary between weekday and weekend. Weekday traffic ranged from 77 to 139 vehicles, weekend traffic ranged from 46 to 129. The month of September is considered to be representative of recreation traffic on Buckman Road (Tetra Tech April 2003).

Planned Uses: Five projects, in addition to Project Power, are currently proposed within the Buckman Road area – three water supply projects, one transmission line upgrade, and road improvement, as follows:

1. The Buckman Supplemental Wells Project – The purpose of this project is to supplement the potable water supply during periods of watershed shortage and peak demand. An EA has been completed for this project and a FONSI has been issued. This project would include the construction and operation of four wells, associated pipelines, and upgraded pumps on BLM lands in the Buckman area, approximately 15 miles northwest of Santa Fe. The findings of the *Buckman Supplemental Wells Environmental Assessment*, was that these alterations would meet VRM Class III and IV guidelines and would not change the overall visual character of the area along Buckman Road.
2. The Buckman Water Diversion Project – The purpose of this project is to meet future water needs in a region experiencing rapid growth. An EIS is currently being completed for this project. This project would include the construction and operation of a surface water diversion system and associated infrastructure, and a new electrical substation and distribution line. While the EIS is not currently complete for this project, any changes proposed that would occur on BLM lands would be required to comply with VRM classifications.
3. Norton-Hernandez Reconductoring Project – The purpose of this project is to increase the transmission capability of the PNM Northern New Mexico system. An EA has been completed for this project and is currently pending decision. This project would include reconductoring the existing Norton-Hernandez 115kv overhead electric transmission line. The findings of the *Norton-Hernandez Reconductoring Project Environmental Assessment* were that the physical contrast associated with the proposed alternative is anticipated to be low to moderate and is expected to meet the VRM interim objectives.
4. El Monte Road - The purpose of this project is to provide access to a private undeveloped tract off of Buckman Road across BLM land. The road would cross 1 to 2 miles of BLM land.
5. Buckman ACEC Study – provides visual resource, recreation, and access guidelines for resource management.

Description of Proposed Alternative: Each of the proposed alternatives would involve either rebuild or double-circuit of an existing line within the Buckman Road corridor. All alternatives originate from the Norton Switching Station, are located on BLM property, and each would require a portion of the AN line to be rebuilt. Alternatives A and F would also require the NZ line to be double-circuited, and Alternative O would require a small portion of the NZ line to be double-circuited. While areas of rebuilt line would utilize existing structures, double-circuit line would require replacement of existing structures.

The AN line is a wood-pole H-frame design. Rebuilding the AN line would require raising the crossarm, reframing the structure, and reconductoring (replacing the existing phase conductors with new wire). An overall increase in aboveground height of 6 to 12 feet is anticipated.

The NZ line is also a wood-pole H-frame design. This transmission line would be replaced with a double-circuit within the existing transmission corridor. The existing structures would be removed and a new facility would be rebuilt on the existing

alignment. The existing H-frame structures would be replaced with tubular steel poles with a brown self-weathering steel finish.

Each alternative within the Buckman Road corridor utilizes existing transmission facility and existing access patrol trails within an existing utility corridor. The contrast associated with changes from rebuilding the existing line may be noticeable but would be weak, not dominant. The contrast associated with Alternative A, F, and O from double-circuiting portions of the existing line would also be weak, resulting in a narrower structure profile with fewer structures. As documented in the visual resource section of Chapter 3, the changes associated with proposed projects on BLM land would be compatible with the BLM interim VRM classes assigned to this area (Class III and Class IV).

Construction of the transmission lines on BLM lands would take place over a 2-month period. It is expected that construction traffic would result in about 10 trips per day, or 50 trips per week, in and out of the Buckman Road corridor area. Construction of improvements to Norton Switching Station would require 4 months with 5 trips per day, or 25 trips per week, in and out of the area. Access to the AN and NZ lines would be from Caja del Rio Road and Buckman Road. Approximately 3 miles of Buckman Road that would be used during construction are located on BLM lands, with the majority of this road traversing private lands.

Summary of Cumulative Impacts: Cumulative visual impacts were not identified in the Buckman Supplemental Well EA or the Norton-Hernandez Reconductoring Project EA. Due to the weak visual contrast of proposed alternatives in the Buckman Road corridor, the proposed alternatives would not cause cumulative impacts when added to the other planned project described above. The Proposed Alternatives and the planned projects would not individually or collectively dominate the landscape setting. Overall mitigation to reduce visual contrast for all facilities would avoid cumulative visual impacts to the corridor. Transmission line and switching station construction crews would utilize Buckman Road to access the existing transmission line corridors of Norton Switching Station. Construction activities during most parts of the day would be confined to transmission line access roads. This would avoid cumulative impacts to construction traffic on Buckman Road.

3.8.6.2 City of Santa Fe 5-mile Extraterritorial Zone (ETZ)

Tres Arroyos Planning Area

Existing Uses: The Tres Arroyos Planning Area is located in the project area. Residents of this community are currently in the process of developing a community plan with Santa Fe County for their area as a contemporary community. The Tres Arroyos boundary is delineated as the Municipal Recreation Complex on the west, NM-599 on the south, and Las Campanas on the north. Issues being addressed by the plan include identifying proposed trail connections and acquiring trail access, addressing commercial uses, lighting, and retaining current residential densities (Personal communication, February 24a, 2004).

Planned Uses: No planned or proposed projects in addition to Project Power have been identified within the Tres Arroyos Planning Area.

Description of Proposed Alternative: Alternatives A and F would include rebuild of existing NZ line. The NZ line in is a wood-pole H-frame design. This transmission line would be replaced with double circuit structures within the existing transmission corridor.

The existing structures would be removed and a new facility would be rebuilt on the existing alignment. The existing H-frame structures would be replaced with tubular steel poles with a brown self-weathering steel finish. The contrast associated with changes from rebuilding the existing line may be noticeable but would be weak, not dominant.

Summary of Cumulative Impacts: Because contrast associated with proposed alternatives is weak, and no other industrial related projects are planned for this residential area, anticipated changes would be subordinate to the existing landscape character of this area. No cumulative impact would occur within this planning area.

Municipal Recreation Complex

Existing Uses: The Municipal Recreation Complex is located northwest of the City of Santa Fe, within the 5-mile ETZ. This Recreation Complex is regional park consisting of open space, trails, a golf course, and ball fields. The NZ line currently parallels the northern portion of the Municipal Recreation Complex, and the AN and NB lines cross the western portion of the complex.

Planned Uses: The Buckman Water Diversion Project – The purpose of this project is to meet future water needs in a region experiencing rapid growth. An EIS is currently being completed for this project. This project would include the construction and operation of a surface water diversion system and associated infrastructure.

Description of Proposed Alternative: Several proposed alternatives border the Municipal Recreation Complex. Alternative A and F would include rebuild of the existing NZ line north of the recreation complex. The NZ line in is a wood-pole H-frame design. This transmission line would be replaced with a double-circuit within the existing transmission corridor. The existing structures would be removed and a new facility would be rebuilt along the existing alignment. The existing H-frame structures would be replaced with tubular steel poles with a brown self-weathering steel finish. The contrast associated with changes from rebuilding the existing line may be noticeable but would be weak, not dominant.

Alternatives O and S would require construction of new line west and south of the recreation complex. The establishment of new transmission would result in moderate-strong contrast. The construction of new transmission lines occurs within largely unobstructed open and panoramic views, resulting in changes that attract attention, and begin to dominate the setting.

Summary of Cumulative Impacts:
Views from the recreation and open space areas in this complex are outward-oriented toward distant views. The construction of Alternatives O and S would result in views to transmission lines from all directions from the recreation complex. The addition of these new transmission line corridors on the west and south sides of the complex would essentially result in surrounding the complex on all sides with transmission lines. The existing transmission line facilities are skylined as viewed from the Municipal Recreation Complex. The proposed new transmission line corridors on the west and south sides would also be skylined, resulting in cumulative impacts to the visual setting and recreation experience. Alternatives A and F would not result in cumulative effects.

Agua Fria Traditional Historic Community

Existing Uses: Agua Fria is characterized by a pattern of diverse and mixed community land use, the presence of historic structures and the existence of a village center. The village runs south to north from Rufina Street to the Santa Fe River and east to west from Henry Lynch Road to just beyond Lopez Lane. Beginning in the 1920s, plots of land were subdivided into long, narrow parcels oriented such that a maximum number of landowner heirs could access water from the Santa Fe River and acequias. The existing ZB line runs mostly east-west through the length of the Agua Fria THC and the NZ line runs north-south through the width of the Agua Fria THC.

Planned Uses: Planned utility projects are limited to improvements to PNM's local distribution system.

Description of Proposed Alternative: Alternatives A and F traverse the Agua Fria THC.

Alternative A would include rebuild of the existing NZ line lines that currently cross the width of the Agua Fria THC. The NZ line is a wood-pole H-frame design. This transmission line would be replaced with double-circuit structures within the existing transmission corridor. The existing structures would be removed and a new facility would be rebuilt on the existing alignment. The existing H-frame structures would be replaced with tubular steel poles with a brown self-weathering steel finish. The contrast associated with changes from rebuilding the existing line may be noticeable but would be weak, not dominant.

Alternative F would include a new switching station at the intersection of the NZ and ZB lines. Switching stations are relatively large and visually complex facilities. Components included in the switching station include termination structures, power circuit breakers, disconnect switches, lightning/surge arrestors, and bus (conductor) support structures. The station yard is typically enclosed with either a chain link fence or block wall. Access roadways would be developed to and within the yard. The contrast associated with changes from adding the Zia North Switching Station would result in strong visual contrast from residences nearby.

Summary of Cumulative Impacts: The changes from the Proposed Alternative F would result in utility facilities becoming more visually dominant in the community. As a result, Alternative F would result in cumulative impacts due to the combination of a new switching station with past electric and transportation infrastructure. Alternative A would not result in cumulative effects due to the weak visual contrast of this alternative.

Southwest Area Plan

Existing Uses: Southwest Area Plan is composed of residential and mixed commercial uses. The existing ZB line and NZ line traverse this area.

Planned Uses:

6. New Zafarano Substation – the purpose of this project is to provide capacity to the southwest section of Santa Fe. The Zafarano Substation is proposed to be located between Cerrillos Road and Rufina Road, within 600 feet of the proposed Zafarano Road.

7. 115kV Inner City Loop - PNM is currently exploring routing alternatives for a 115kV inner city loop. One possibility includes upgrading a 46kV circuit to 115kV operation between Rufina Street and Zia Switching Station.
8. Santa Fe River and South Meadows Road - The planned South Meadows Road crossing of the Santa Fe River is at a location where Santa Fe County is developing a trail system in the coordination with NM State Lands upstream of the 599 bridge, as well as revegetation and restoration along the river.
9. NZ 115kV Tap to Miguel Lujan Substation – This project includes construction of a new 115kV single-circuit line from the NZ 115kV line where it crosses Rufina Street generally east along Rufina Street, the City yards, and Industrial Road to the Miguel Lujan Substation. Operation of the Miguel Lujan Substation would be upgraded from 46kV to 115kV. The purpose of this project is to reduce electric loads on the local 46kV sub-transmission system.

Description of Proposed Alternative: Alternative O includes new line with distribution underbuild along Airport Road through a residential area, resulting in moderate-strong visual contrast. The construction of a new line with distribution underbuild along Airport Road would attract attention, and begin to dominate the setting.

Alternative A would include a rebuild of the existing NZ line extending south out of Agua Fria into the Zia Switching Station. The NZ line is a wood-pole H-frame design. This transmission line would be replaced with double-circuit structures within the existing transmission corridor. The existing structures would be removed and a new facility would be rebuilt on the existing alignment. The existing H-frame structures would be replaced with tubular steel poles with a brown self-weathering steel finish. The contrast associated with changes from rebuilding the existing line may be noticeable but would be weak, not dominant.

Summary of Cumulative Impacts: Alternative A and O would not result in cumulative impacts to the Southwest Area because they consolidate and make use of existing facilities.

Community College District

Existing Uses: The Community College District is developing with commercial and light industrial development oriented toward the I-25, North Highway 14 and NM-599 area along with compact residential development among surrounding open space and trails. The terrain in this district is rolling hills, with high points providing open views to distant landscapes. Two transmission lines, the RS and SL lines, traverse the Community College District. While views in this area are often open and panoramic, the existing transmission lines are distant from developed recreation trails and clustered residential development.

Planned Uses: Only one planned project is identified in the Community College District, a tap from the SL line to a new substation in the Rancho Viejo area.

Description of Proposed Alternative: Alternative S would include construction of new line and a rebuild of a portion of the SL line, and the new Zia South Switching Station. The establishment of new transmission would result in moderate-strong contrast. The construction of a new transmission line would occur within largely unobstructed open and panoramic views, resulting in changes that could attract attention, and begin to

dominate the setting. The contrast associated with changes from rebuilding the existing SL line may be noticeable but would be weak, not dominant.

Summary of Cumulative Impacts: The combination of the RS, SL and new Alternative S line would form a transmission line ring in the Rancho Viejo Area. Due to the context of the planned development in the area, these facilities would become a part of the infrastructure. No cumulative impacts would occur for construction of Alternative S, because the area is spacious enough to absorb the visual impact the existing and planned facilities.

Santa Fe Metro Area Highway Corridor Plan Area

Existing Uses: Existing uses in this area NM-599 and I-25. Highway NM-599 is a designated Scenic Corridor.

Planned Uses: Only one project is identified in the 599 and I-25 Corridor Plan areas, a buried treated water return pipeline along NM-599.

Description of Proposed Alternative: Alternative S includes new single pole transmission line parallel to NM-599 and crossing I-25 (in the vicinity of the RS line), resulting in moderate-strong visual contrast. The construction of a new line along NM-599 would attract attention, and begin to dominate the setting.

Summary of Cumulative Impacts: The combination of Alternative S and a buried pipeline is not anticipated to result in cumulative visual impacts.

Chapter 4. Scoping, Consultation, and Coordination

The initiation of the Project Power Environmental Assessment (EA) began with the submittal of a *Plan of Development* and an *Application for Transportation and Utility System and Facilities on Federal Land* to the Bureau of Land Management's (BLM) Taos Field Office in September of 2002. The EA document has been prepared in accordance with the Memorandum of Agreement (MOA), signed in March of 2003, between the BLM, the cooperating agencies (City of Santa Fe, State of New Mexico), and the applicant, PNM.

The following sections include discussions of Scoping, Agency Consultation and Coordination, and Project Power Planning Studies performed prior to initiating the Project Power EA

4.1 Scoping

The intent of scoping is to identify the issues to be addressed as a part of the environmental assessment process. It is an ongoing, open process intended to integrate the views and concerns of the public, local, state, and federal agencies regarding the proposed project. Other objectives of scoping include:

- Evaluation of issues
- Determination of alternatives to be evaluated and development of screening criteria
- Identification of environmental review and consultation requirements
- Identification of local ordinances, regulations, and applications
- Development of the environmental analysis process and technical studies to address issues in the EA document

Initially, two scoping meetings were held in late June 2003. Due to a less than desired attendance at the two initial scoping meetings and issues of concern raised by members of the Agua Fria community, the Bureau of Land Management (BLM) held a NEPA process meeting in Agua Fria and additionally required three scoping meetings in August 2003.

At the BLM NEPA process meeting, the BLM made the commitment to reintroduce the eight alternatives previously screened out due to technical and environmental criteria established by the Community Working Group for public review and comment.

4.1.1 Notification of Public Scoping Meetings

Newsletters were sent to individuals and organizations on the project mailing list. Additional notifications were placed in local churches, school bulletin boards, and community center bulletin boards. Maps of the original 11 transmission options for the project were sent to those on the project mailing list for the meetings held on August 20 and 21, responding to requests made at the August 19 scoping meeting in order to provide more detail of the original 11 transmission alternatives reviewed by PNM.

Advertisements for scoping meetings were published in the *Albuquerque Journal North, Santa Fe New Mexican,* and *Santa Fe Reporter* newspapers. The advertisements for the three August scoping meetings were published in the *Santa Fe Reporter* on Wednesday, August 13, 2003 and Wednesday, August 20, 2003. The *Albuquerque Journal North*

published the ad on Thursday, August 14, 2003 and Monday, August 18, 2003. The *Santa Fe New Mexican* ran the ad on Thursday, August 14, 2003 and Monday, August 18, 2003. The newspaper circulation for the respective publications is as follows:

- *Albuquerque Journal North:* 15,500 papers / week
- *Santa Fe New Mexican*: 25,000 papers / week
- *Santa Fe Reporter:* 20,000 papers / week

Notification flyers for the August scoping meetings were placed at mailbox groups along Agua Fria Road and at commercial businesses in the area. Notifications were also placed in the San Isidro church bulletins in Agua Fria and at the facilities where the scoping meetings were held. PNM and BLM also included information about the project and the scoping meeting dates on their respective websites.

4.1.2 List of Meetings

In May through August 2003, a total of seven scoping meetings were held in the Santa Fe area and are listed in Table 4-1.

Table 4-1. Scoping Meetings

Date, Time	Location	Address	Public Attendees
May 22, 2003 2:00 – 4:00 pm	Santa Fe Courtyard Marriott	3347 Cerrillos Road, Santa Fe, NM 87505	24
May 22, 2003 7:00 – 9:00 pm	Santa Fe Courtyard Marriott	3347 Cerrillos Road, Santa Fe, NM 87505	
June 26, 2003 7:00 – 9:00 pm	Agua Fria Elementary School	3160 Agua Fria Street, Santa Fe, NM 87501	21
July 29, 2003 7:00 – 9:00 pm	Agua Fria Elementary School	3160 Agua Fria Street, Santa Fe, NM 87501	79
August 19, 2003 7:00 – 9:00 pm	Agua Fria Elementary School	3160 Agua Fria Street, Santa Fe, NM 87501	68
August 20, 2003 7:00 – 9:00 pm	The Inn at Sunrise Springs	242 Los Pinos Road, Santa Fe, NM 87507	21
August 21, 2003 7:00 – 9:00 pm	Genoveva Chavez Community Center	3221 Rodeo Road, Santa Fe, NM 87507	24

4.1.2.1 Written Comments

Copies of all written comments on the project and public meeting transcripts are located in the administrative file with the Bureau of Land Management, Taos Field Office and at the J.F. Sato & Associates office in Littleton, CO.

4.2 Agency Consultation and Coordination

The following is a list of the agency contacts.

4.2.1 Federal Agency Contacts

US Department of the Interior, Bureau of Land Management,
Taos Field Office

Ron Huntsinger, Taos Field Office Manager
Sam DesGeorges, Assistant Field Office Manager, Multi-Resources
Sher Churchill, NEPA Coordinator
Lora Yonemoto, Realty Specialist
Tami Torres, Outdoor Recreation Planner and Visual Resource Specialist

US Department of the Interior, Fish and Wildlife Service,
New Mexico Ecological Services Field Office

Joy E. Nicholopoulos, State Supervisor

4.2.2 Native American Contacts

Pueblo of San Juan

Governor, Earl Salazar

Pueblo of Santa Clara

Governor, Denny Gutierrez

Pueblo of San Ildefonso

Governor, John Gonzales

Pueblo of Pojoaque

Governor, Jacob Viarrial

Pueblo of Tesuque

Governor, Marvin Herrera

Pueblo of Cochiti

Governor, Simon Suina

Pueblo of Santo Domingo

Governor, Edward F. Chavez

Pueblo of Nambe

Governor, Tom Talche, Jr.

Hopi Tribe Cultural Preservation Office

Leish Kuwanwisiwma, Director

4.2.3 State Contacts

State Land Office of New Mexico

Dennis Garcia, Public Lands Resources Director

New Mexico Sustainable Energy Collaborative Energy Conservation and Management Division

Chris Wentz, Director, New Mexico Energy, Minerals and Natural Resources Department

4.2.4 County Contacts

Santa Fe County

Roman Abeyta, Director of Land Use Department
Penny Ellis-Green, Planning
Rudy Garcia, Project and Facilities Management
Robert Griego, Planning
Judy McGowan, Senior Planner
Beth Mills, Planner and GIS Specialist

Paul Olaffson, Trails and Open Space Planner
Earl Wright, GIS Coordinator

Santa Fe County Commission
Commissioner, Paul Campos

Extraterritorial Zoning Commission
Commissioner, Pat Gonzales

San Miguel County
Les W.J. Montoya, County Manager

4.2.5 Local Agency Contacts

City of Santa Fe
Richard E. Carlisle, Director of Technology and Telecommunications
Bernie Garcia, Recreation Planner, Municipal Recreation Complex
Dennis Gee, Public Utilities Division
Perry Knockel, Planning
Reed Liming, Director, Long-Range Planning
Randy Thompson, Trails and Open Space Coordinator

City of Las Vegas
Richard R. Trujillo, Director of Water and Gas Division

4.3 Project Power Planning Studies

Prior to initiating the Project Power EA, PNM involved the public in conducting planning studies to evaluate a broad range of alternatives to address the need for electrical system improvements in the Santa Fe area. The steps in these studies are outlined below.

- Agency and elected officials were briefed on the project need and proposed planning studies to identify alternatives through a public planning process.
- PNM created a **Technical Working Group** (TWG) composed of representatives from each of the major divisions within PNM as well as a planning and facilitation consultant team.
- A **Leadership Team** was formed, consisting of community leaders and representatives from the public.
- A workshop called a **Search Conference** was held to consider what sources of energy would best meet the needs of the Santa Fe/Las Vegas area, and the issues to be considered in developing electrical system improvements.
- PNM formed a **Community Working Group** (CWG), consisting of representatives from the Search Conference to advise on the evaluation and screening of energy alternatives. This resulted in the recommendation of alternative transmission line routes between Norton Station and Zia Station.
- **Project Power newsletters** were prepared, discussing the project background and the alternatives initially being considered by the BLM; these were sent to landowners and interested groups in the project area.

- Scoping meetings were publicized, using newspaper and radio advertisements, television interviews, media releases, and website announcements.
- Seven **scoping meetings** were held in the Santa Fe area.
- Public scoping comments and identification of issues were documented.

The issues addressed by this EA incorporate the results of the technical studies and public involvement summarized above. The activities described below assisted in development of the issues and concerns related to the project.

4.3.1 Public Participation Program

PNM conducted a **public participation program** designed to inform, educate, and involve the public in its decision-making.

As part of the program, PNM briefed local officials, established a **Leadership Team** of community leaders, conducted a two-day "search" event to initiate public involvement activities, sponsored a **Community Working Group (CWG),** formed a **Technical Working Group (TWG)** and conducted public open houses. In addition, PNM developed a project website (www.project-power.org) with email response capability, a telephone information line, fact sheet, media releases, and paid advertisements to announce the open houses. The details of these activities are provided below.

4.3.1.1 Briefings

In late 2000, PNM briefed agency and elected officials by presenting an overview of the project and proposed approach, soliciting comments and gaining support for the public planning process. This led to the development of the Leadership Team.

4.3.1.2 Leadership Team

In January 2001, PNM assembled a Leadership Team of 14 community leaders from Santa Fe, Las Vegas, Taos, and Albuquerque to serve as advisors throughout the process. The Leadership Team developed the focus of a two-day collaborative event, referred to as a Search Conference, conducted by the STAR Group, LLC. The Team developed the focus question for the event: *What are the most feasible methods to ensure sufficient and reliable power for all residents and businesses of Santa Fe and San Miguel counties by the year 2004?*

The Leadership Team prepared an outline for a resource document of educational information for the Search Conference participants to review, and selected an eight-member Technical Advisory Team to identify the kinds of educational information that would be helpful. Also, the Leadership Team identified stakeholder groups and nominated individuals representing a cross-section of the communities to participate in the event. Members of the leadership team are listed in Table 4-2.

Table 4-2. Leadership Team Members

Name	Company / Affiliation	Role
Frank Aragon	PNM	Santa Fe Division, Area Manager
Terry Brunner	Santa Fe County	Policy Analyst
Melvin Christopher	PNM	Vice President
Sam DesGeorges	BLM	Assistant Manager
Jens Diechmann	NM State Land Office	Assist Commissioner
Keven Groenewold	NM Rural Electric Cooperative Association	Executive Vice President
Dennis Hines	PNM	Director
Jack Maes	City of Las Vegas	City Manager
Becky Martinez	City of Santa Fe	Director
Les Montoya	San Miguel County	County Manager
Chris Moore	City of Santa Fe	Councilor
Bob Taunton	Rancho Viejo	Vice President
Lucky Varela	New Mexico Legislature	Representative
Cathie Zacher	SFEDI	Executive Director

4.3.1.3 Search Conference

The **Search Conference,** conducted on May 9 and 10, 2001, was designed to initiate community involvement efforts, to obtain substantive public input quickly, and engage the community in solving a major problem affecting its future. Approximately 35 people participated in the Search Conference, including elected officials, representatives of state and local government agencies, business, large power users, community advocates, alternative energy advocates, environmental advocates, land developers, tribal representatives, youth, and PNM. Prior to the conference, these participants were given the resource document prepared by the Leadership Team that educated them on electric power issues, and specifically, the energy alternatives that would be discussed in the conference.

The preliminary alternative solutions discussed during the Search Conference included:

- No action
- Renewable resource generation
  - Wind
  - Solar
- Distributed generation (grid-connected, dispatchable)
  - Micro turbines
  - Fuel cells
  - Reciprocating (internal combustion) engines
  - Battery energy storage system
- Demand-side energy management alternatives
- Conventional generation alternatives
  - Combustion turbines

    - Upgrade Las Vegas turbine
- Transmission alternatives

Other generation alternatives were discussed, but were immediately eliminated from further consideration. These alternatives included nuclear, hydropower (pumped storage), and steam (combined cycle) generation. Nuclear power was eliminated because of local concerns and long lead times for implementation. Hydropower was eliminated because of the lack of water resources in sufficient quantities. Conventional steam units are not available in a unit size small enough for addressing the Santa Fe and Las Vegas problem.

At the end of the two-day Search Conference, the participants were invited to continue their involvement in the public planning process as a **Community Working Group (CWG),** to examine the issues and alternatives resulting from the Search Conference. Approximately 20 participants volunteered to continue their involvement. The CWG is discussed in section 4.3.1.5.

4.3.1.4 Technical Working Group Established

Following the Search Conference, PNM formed a Technical Working Group (TWG) composed of representatives from each of the major divisions within PNM. Through a series of workshops, PNM's TWG developed a study approach; explored a broad range of alternative means of solving the problem; developed technical criteria by which to evaluate the effectiveness of the alternatives; and developed the public participation program.

The potentially viable technologies identified that could meet the electrical power needs in the Santa Fe and Las Vegas area by 2003-2004 were reviewed and considered by the CWG and TWG.

The TWG reviewed planning and operations criteria in order to measure the technical ability of the alternatives to meet the Santa Fe/Las Vegas power needs. The primary consideration was how the alternative would perform to ensure the ability of the system to serve the electrical requirements (load) of the Santa Fe/Las Vegas area when one transmission line and/or other critical equipment is out of service (referred to as *n-1* conditions under criteria established by the North American Electrical Reliability Council [NERC] and Western Systems Coordinating Council [WSCC]). Consideration was also given to the ability of the alternative to allow the system to perform when two transmission lines and/or other critical equipment are out of service (referred to as *n-2* conditions).

In addition to the criteria required under the NERC and the WSCC, the group also addressed a broad range of performance capabilities of the alternatives, including: increased access to competitive sources of power; improved flexibility to perform maintenance; reduced reliance on generation resources outside of the Santa Fe/Las Vegas area; whether a generation alternative would require additional power transmission; commercial availability of the technology; ready availability and dispatchability of the technology; unit size and number of units required incrementally over time; lead time needed to develop a project; fuel supply needed (for generation alternatives); environmental and other regulatory considerations associated with implementation of the alternative; and operational history of the technology (that is, whether the technology was proven, had mixed experience, or had limited experience).

4.3.1.5 Community Working Group Activities

The CWG and TWG convened in four facilitated meetings during June to September 2001. Independent specialists with knowledge about the alternative technologies were invited to speak at the meetings. Topics included conservation, renewable energy, distributed energy resources, natural gas, energy load patterns, and transmission planning, design, and construction.

The CWG and TWG reviewed alternatives for short-term solutions that could be implemented by winter 2003-2004 and energy concepts for longer-term solutions. They performed two levels of screening for the alternatives considered for this project. Level 1 studied all of the potentially viable energy alternatives discussed at the Search Conference, and culminated in the selection of the transmission alternative. The second level of screening narrowed down the transmission options to take into the scoping process.

Members of the CWG are listed in Table 4-3.

Table 4-3. Community Working Group Members

Name	Company / Affiliation	Role
David Bacon	Alternative Energy Advocate	
Dennis Garcia	State Land Office	Director, Public Lands
Terry Brunner	Santa Fe County - changed position to Senator Bingaman's office	Policy Analyst
Dennis Gee	City of Santa Fe	Public Utilities Division
Commissioner Paul Campos	Santa Fe County Commission	Commissioner
Councilor Miguel Chavez	City of Santa Fe	Councilor
Commissioner Pat Gonzales	Extraterritorial Zoning Commission	Commissioner
Matt O'Reilly	Developer	Civil Engineer
Ann Condon	City of Santa Fe	Director of Planning
John Pacheco	Santa Fe Community College	Former President
Chris Rael	St. Vincent Hospital Administration	Vice President
John Stevens	Sandia National Labs	Senior Technical Staff
Ben Luce	New Mexico Solar Energy Association	President
Al Pitts	Infrastructure development consultant	Consultant
Les W.J. Montoya	San Miguel County	County Manager
Laura Montoya	New Mexico Highlands University student - became representative to Senator Bingaman	Las Vegas Community Representative
Richard Trujillo	City of Las Vegas	Director, Water/Gas Division
Councilor Matthew Ortiz	City of Santa Fe Council	Councilor
Chris Wentz	NM Sustainable Energy Collaborative	Director, Energy Conservation and Management Division NM Energy, Minerals and Natural Resources Department

Name	Company / Affiliation	Role
Philip Saltz	Santa Fe Northwest Area Advisory Committee	President
Rudy Garcia	County of Santa Fe	Policy Analyst

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